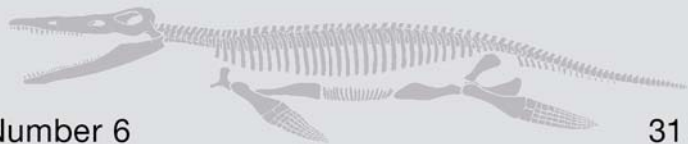


Bulletin of the Museum of Comparative Zoology



Volume 162, Number 6

31 January 2020

Wilmot W. Brown: One of The Most Prolific Collectors of the Vertebrate Fauna of the New World

Kevin B. Clark



HARVARD UNIVERSITY | CAMBRIDGE, MASSACHUSETTS, U.S.A.

WILMOT W. BROWN: ONE OF THE MOST PROLIFIC COLLECTORS OF THE VERTEBRATE FAUNA OF THE NEW WORLD

KEVIN B. CLARK¹

ABSTRACT. Wilmot W. Brown (1870?–1953) collected birds, mammals, amphibians, and reptiles from 1890 until his death in 1953, amassing a collection that forms the core of knowledge of the distribution and taxonomy of the terrestrial vertebrate fauna of Central and South America. His collection of more than 18,000 bird specimens is spread over 25 institutions, although his longest collaboration was with Outram Bangs and John Thayer of the Museum of Comparative Zoology. He collected throughout the Caribbean; northern South America, including Colombia and Panama; and principally throughout Mexico, where he was based for more than 40 years, forming one of the most important collections ever amassed for that country. He collected more than 750 specimens now classified as some form of type specimen, and at least eight taxa are named in his honor, including two reptiles, a mammal, and five birds. Although he sent regular, detailed correspondence back to his benefactors in the United States, he never published a single professional article, and no field journal has been located, leaving his legacy obscured. In an era of lax data collection and fraudulent collectors, Brown's specimens and associated data have proven to be of high quality and help form the basis for our current understanding of New World biodiversity, although his legacy is marred by his disregard for the conservation plight of the species he collected.

Key words: Wilmot W. Brown, Collector, Collections, Mexico, Panama, Colombia, Grand Cayman, Birds, Museum of Comparative Zoology, Outram Bangs, Mammals, Reptiles

INTRODUCTION

Wilmot W. Brown (1870?–1953; Fig. 1) collected birds, mammals, amphibians, and reptiles from 1890 until his death in 1953, amassing a collection that forms the core of

knowledge of the distribution and taxonomy of the terrestrial vertebrate fauna of Central and South America. His collection of more than 18,000 bird specimens (Peterson et al., 2004) is spread over 25 institutions (Vert-Net, 2019). He collected throughout the Caribbean; northern South America, including Colombia and Panama; and principally throughout Mexico, where he was based for more than 40 years, forming one of the most important collections ever amassed for that country. He collected more than 341 mammal, 211 bird, 196 reptile, and 11 amphibian specimens listed as some form of type specimen, although he is rarely directly credited with their discovery. Although he sent regular, detailed correspondence back to his benefactors in the United States (Appendix 1), he never published a single professional article, and no field journal has been located, leaving his legacy obscured. While better known for his bird collecting, Brown also made extensive mammalian and herpetological collections that are key to our understanding of the distribution and taxonomy of those groups, and at least eight taxa are named in his honor, including two reptiles, a mammal, and five birds (Appendix 2).

By 1900 a fierce debate was occurring in the United States over whether and how to conserve species that were seemingly going extinct in rapid succession. The near extinction of the American Bison (*Bison bison*) was one catalyst for this debate, but the regular reports of wanton slaughter of

¹ San Diego Natural History Museum, 1788 El Prado, Balboa Park, San Diego, California 92101. Author for correspondence (kclark@sdnhm.org).

wildlife for food or fashion also fed public anger, which resulted in the rise of the Audubon Society and other conservation groups that lobbied for increased wildlife protection in response (Barrow, 1998). To modern eyes, the seemingly preventable extinctions of iconic North American species such as the Labrador Duck (*Camptorhynchus labradorius*), Great Auk (*Pinguinus impennis*), Passenger Pigeon (*Ectopistes migratorius*), and Ivory-billed Woodpecker (*Campephilus principalis*) are tragic tales of missed opportunities that have left whole ecological communities, as well as modern human society, diminished to an unknown degree. As we shall see, Wilmot W. Brown had a cavalier attitude toward species conservation, which is especially disturbing in light of the subsequent decline to extinction of some of the species he collected. However it must be remembered that the status and distribution of much of the New World fauna was very poorly known in the 1890s, when Brown began collecting for museums, and there was an eagerness, not to mention financial incentive, to discover and document as much of the natural history of the continent as possible. To this day the presettlement distribution of even charismatic species such as the Merriam's elk (*Cervus elaphus merriami*) in Arizona, the gray wolf (*Canis lupus*) in California, or the American Flamingo (*Phoenicopterus ruber*) in Florida are poorly known (Schmidt, 1991; Carmony, 2009; Whitfield et al., 2018). Without the diligent collectors and explorers recording their observations and collecting specimens for science, our modern conservation efforts would be lost in trying to determine where endangered species originally occurred and where they can be reintroduced. It was collectors such as Brown, collecting for museums that preserved these records in perpetuity, that allow us to attempt to understand and even reconstruct whole communities of organisms in places now irrevocably altered by modern society.



Figure 1. Portrait of Wilmot W. Brown in 1930.

Furthermore, the vast majority of species that went extinct, or nearly so, during this period were driven to their fate through either direct hunting for food, fashion, hides, oil or other consumptive uses; extensive habitat destruction; feral cats or other introduced predators; or a combination of all of these influences. Scientific collectors generally took so few individuals of any one species in any given area that they had almost no effect on a species' conservation status, although once a species became endangered, almost any loss could be detrimental.

As we shall see, however, Brown's own actions contributed to the decline of several rare species he collected, and he continued his collecting efforts despite knowing of their negative effects—and in some cases where he knew his actions were expressly illegal. Therefore, when considering his legacy, his significant contributions to our modern understanding of vertebrate taxon-

omy and distribution must be balanced against his actions in imperiling some of the species he collected.

Brown was originally from Somerville, Massachusetts, where by 1890 he had amassed an impressive collection of local birds (Hitchcock, 1890). By 1891 he was in the Caribbean, collecting birds in Puerto Rico and nearby islands (Cory, 1892).

He first wrote to Outram Bangs, who was later to become curator of mammals at Harvard's Museum of Comparative Zoology (MCZ), in 1895 looking for sponsors to send him to South America to collect. Bangs soon sent him to the southern United States, where he collected in Georgia, Alabama, and Florida in 1896–1897. It was in Fernandina, Florida, that he writes of one of several close calls with law enforcement investigating his collecting activity: "I was obliged to leave Fernandina, Fla. in very much of a hurry as I got into trouble with the authorities over shooting birds, and would have been heavily fined had I not sailed away at midnight . . . The authorities also learned that I was hunting deer which did not improve the situation. The fine for shooting deer out of season is \$3.00!" (19 April 1897 letter; see Appendix 1 for all correspondence details).

In the late 1890s, Walter Rothschild, scion of one of the wealthiest families in the world, was compiling an immense zoological collection at the family's estate in Tring, England. With his ornithological curator Ernst Hartert, he was sponsoring collecting expeditions around the world. Hartert himself had attempted to reach Venezuela, although he had been diverted to the Caribbean because of hostilities there (Rothschild, 2008). Hartert and other sponsored explorers had successfully collected birds in central Africa, India, Sumatra, and the Galapagos Islands. The Rothschild Collection would eventually encompass more than 300,000 bird skins and 200,000 bird eggs before the bulk of it was sold to the American Museum of Natural History

(AMNH) in 1932 (Stearn, 1998). The curator of the collection in New York became Ernst Mayr, who used the extensive series of skins of individual species to document intraspecific geographical variation, which became the basis of his *Systematics and the Origin of Species* (Mayr, 1942), one of the foundational texts of the neo-Darwinian evolutionary synthesis of the mid-twentieth century.

Brown wrote to Hartert in 1897 seeking a sponsor for a trip to Venezuela, because specimens from there were in great demand. However, Hartert was already sponsoring several collectors in Venezuela, including George Cherrie, later with the AMNH and future companion of Theodore Roosevelt on the River of Doubt expedition in Brazil in 1912. Hartert suggested Brown travel to Colombia instead, and Brown, receiving Hartert's telegram a few days before departing for Venezuela, changed his plans to go the Sierra Nevada de Santa Marta in northeastern Colombia. Between his arrival in December and his descent from the Sierra in April, Brown heard nothing from Hartert and concluded that Hartert had backed out of the deal. Brown may have anticipated the event, because he had kept up a correspondence with Bangs, trying to convince him to sponsor him at \$110 per month for his collecting. Brown claimed that Hartert, as the collector for the Rothschilds, and with plenty of money behind him, would pay top dollar for the specimens if Bangs did not buy them first (8 Jan 1898 letter). A little bit of bravado did not hurt: "A revolution is expected to break out any day and I have been warned by the American Consul to leave the country. But this I will not do for I came to South America to make a collection and will accomplish what I came for or die in the attempt" (15 Dec 1897 letter). The relationship between Brown and Bangs would last for the next three decades.

COLOMBIA (1897–1899)

Brown's travels in the Sierra Nevada de Santa Marta on the north coast of Colombia were productive, even though he sometimes complained about the hospitality. Brown lived for 5 weeks with the Arhuaco Indians, who helped him check his traps and guided him through the Sierra. He lived mostly off of what he trapped and looked to his hosts for cooking assistance, "I gave the bodies of these rats to an Indian girl to cook for herself. I also gave her some bird bodies to make a soup out of for me. Well, to make a long story short, she ate the birds herself and made a soup out of the rats for me, which I ate thinking it was bird soup until I fished a rat out of it with a tail! The soup was pretty good however" (15 April 1898 letter).

Bangs (1899), like many others, was amazed by Brown's persistence and fortitude, no matter what the conditions:

Travelling in the Sierra Nevada is at best slow and laborious and in the rainy season is harder still. Mr. Brown, in order to go as light as possible, carried no tent with him, and cut down his outfit in other ways till much too small for his comfort. Night after night he slept out with no shelter, wet to the skin by the terrific thunder storms that rage in these mountains nearly continuously throughout the spring. His one pair of shoes was soon worn out by the rough travelling, and for the greater part of the trip he went barefoot, his feet and legs exposed to the attacks of wood ticks and numerous insects with every now and then a narrow escape from a fer-de lance or a bushmaster.

Despite the difficult conditions, Brown sent more than 1,000 bird skins and 350 mammal skins to Bangs after his first 6 months of effort (Bangs, 1899).

The field supplies Brown used were minimal to promote portability but con-

tained a variety of tools for the wide range of birds, mammals, reptiles, and butterflies he might collect. A request to Bangs for supplies in 1899 included detailed instructions on an auxiliary shotgun barrel he needed, as well as the following (4 May 1899 letter):

50 pounds Duck Shot
25 pounds No. 4 shot
10 pounds of Powder in Cans
½ Doz. boxes of No. 2 Winchester Primers
8 boxes No. 1½ Winchester Primers
1 Recaper for No. 12 Gauge Shell (a strong one)
100 Stevens Long Everlasting Br__ Shells of 44 Calibre
100 U.S New Climax Paper Shells No. 12 Gage [sic]
1 doz. Boxes of No. 10 Thick Wads
1 doz. Boxes of No. 12 card board wads
5 pounds of Napthalene or shat Mr. Frazar calls "Alba" [a fumigant]
12 Rolls of Cotton Batten
1 small steel vice
300 newspapers
1 fine file.

PANAMA (1899–1904)

In late 1899 Brown arrived in David, Panama, where he proceeded about 20 miles to the west to collect near Divalá, just inland from the Pacific coast. Now cleared and agricultural, this region at the time was primary tropical forest and greatly impressed Brown: "In the luxuriant, cool tropical forest, the red rubber trees and gigantic Spanish cedar abound . . . Around the trunks of the forest trees big vines wind themselves and find their way far up among the branches. On certain trees orchids abound while on other trees they are scarce. Tropical flowers of many species beautify the trails. At night the monkeys (mono congo) [howler monkey (*Alouatta palliata*)] make the forest tedious with their roars" (24 Jan 1900 letter). Bangs (1901b) proceeded to describe six new avian taxa from Brown's

collection. Brown also fathered a child, Serafina Brown Arauz, in Divalá (Heckadon-Moreno, 2004).

Brown then moved to Colon on the Atlantic coast where he made a collection of more than 750 birds and mammals, although 40 of those were eaten by a pig as he left them to dry in the sun: "I was never so mad in my life" (4 April 1900 letter). He also relates that since 1888 millinery hunters had been active in the area to provide feathers to Frenchmen based in the Panama Canal. Probably because of this competition and the suppression of bird populations by the millinery hunters, by April 1900, Brown made plans to leave Colon for the Pacific Coast and the Las Perlas Archipelago. This string of islands lies in the Gulf of Panama, and at this time its natural history had been largely unexplored. Ever since Alfred Russell Wallace's famed collections of fabulous birds and butterflies from the Malay Archipelago in the 1850s and Charles Darwin's even more famous finds in the Galapagos Islands two decades earlier, naturalists and collectors had sought out islands the world over for unique finds. Once Brown arrived in the islands, he stayed for a month and made a collection on San Miguel Island, the largest island in the Bay of Panama (Bangs, 1901b). Bangs (1901a,b,c) would describe four new avian taxa and six mammalian taxa from Brown's brief stay in the islands.

Panama at this time was a semiautonomous department of Colombia, and the whole region was engulfed in "The Thousand Days War," a prelude to the separation of Panama in 1903. Brown, never one to shy away from conflict zones, nevertheless found it difficult to negotiate this strife in Panama, and he returned to Boston. Thinking the revolution over, Brown returned to Colon in October but found the city under martial law and renewed fighting imminent. Brown relocated to western Panama, and by May 1901 he shipped to Bangs more than 1,500 bird and mammal skins, principally

from around Boquete and up to 8,000 ft elevation on Barú Volcano. This included what became the type specimen of the Timberline Wren (*Thryorchilus browni*). By 4 July 1901, Brown wrote Bangs triumphantly that he had reached the summit of the volcano, at more than 11,400 ft elevation. "The summit was a high towering rock. The last rock of the peak was so narrow that I had to straddle it. Under one foot was a sheer fall of some 900 ft., under the other a sharp slope of 600 or 700 ft. I found no signs or marks of a previous ascent. My carriers and men failed to follow me. I left two records of my ascent. The people of David and Boquete claim mine to be the first ascent" (7 July 1901 letter). Brown provided a separate 11-page description of the ascent and the vegetation and birdlife encountered at various elevations: "The characteristic species of this region is a Junco [Volcano Junco, *Junco vulcani*] which feeds partly on the berries. It has a sharp alarm note. Towering up some 300 ft. is the rock barren summit of Mt. Chiriquí [now Volcán Barú], which frowns down in all its majesty on the Caribbean Sea on the north and the Pacific Ocean on the south."

Brown also discovered that a rival collector, J. H. Batty, was collecting in Boquete and was using several paid assistants to collect "on the wholesale plan making big series of all species." Batty was a well-known, charismatic figure in natural history circles, having participated in several high-profile expeditions to remote regions of the western United States. He subsequently wrote a book titled *Practical Taxidermy*, published in 1880. He was well positioned to cash in on his fame and seek sponsors to send him to remote locations to collect. While Rothschild would not hire an unheralded W. W. Brown to collect in tropical America, Batty's fame proved a selling point. Brown suspected as much in letters to Bangs: "I believe Mr. Batty is collecting for the Tring Museum, but am not sure." Brown further wrote to Bangs: "He played

you a mean trick in encroaching on your collecting ground. In my opinion it was a put up job.... It makes me mad" (27 Jan 1902 letter).

The chance that Rothschild took on a more well known figure like Batty proved disastrous. Batty took large series of birds and mammals from mainland Panama and fraudulently changed the dates and localities to make them appear to have been collected from the Las Perlas Archipelago. Rothschild, like many collectors, knew that islands harbored many new species, and Batty likely knew that he could charge a premium for island specimens. Rothschild's collection manager, Hartert, was suspicious, as were several later ornithologists, but it was not until recently that the full scale of Batty's fraud was evident (Olson, 2008). Batty parlayed his "successful" Panama expedition into a paid collecting position with the American Museum of Natural History. They paid Batty \$2,000 per year to collect throughout Central America beginning in 1902. This only lasted a few years however, as Batty was eventually killed in the field when his gun accidentally discharged in southern Mexico in 1906 (Olson, 2008).

Brown returned to the United States in July 1901. By January 1902 he was in La Ceiba, Honduras, on the Caribbean coast. Between 1 and 27 Jan he collected more than 500 specimens. By April 1902 he was back in Colon, Panama, but the war was continuing and he found it impossible to travel. He returned to the United States that summer.

In the spring of 1904, Brown returned to the Las Perlas Archipelago and spent 2 months collecting (Thayer and Bangs, 1905). Two new avian subspecies were described from this collection.

MEXICO (1905–1911)

After returning from Panama, Brown left for Mexico in what would become a life-

long collecting effort throughout that country for the next five decades.

Imperial Woodpecker

Brown knew the Imperial Woodpecker (*Campephilus imperialis*) of western Mexico, the largest woodpecker in the world, was a highly sought after specimen. In September 1905, he spent 2 weeks in the Sierra Madre Occidental among the Mormon colonies of northern Chihuahua, where he procured 17 Imperial Woodpecker specimens in 2 weeks (Snyder et al., 2009). Brown also provided the first descriptions of the nest and eggs of the Thick-billed Parrot (*Rhynchopsitta pachyrhyncha*), which at that time often nested in Imperial Woodpecker nest cavities (Thayer, 1906). He likely paid a high price for local hunters to bring him specimens, for not long after he left the Sierra Madre, word travelled that Imperial Woodpeckers had a high value on their head, as illustrated by an article in the March 1908 *Condor* (Smith, 1908):

Recently there came to my knowledge facts relative to a deplorable slaughter of the Imperial Woodpecker (*Campephilus imperialis*), not so very far south of our border.

Two prospectors (one of whom imparted the information given herewith) were working over a region in west central Chihuahua some fifty miles west of Terrazas (pueblo), a mountainous and heavily forested country, much frequented by the bird in subject. One of the men had heard somewhere of the rarity of the species, and that it bore a commercial value, but erroneously, his conception was that the bill was the portion in demand, and not the prepared skin. Working on this idea he shot some seventeen of the magnificent creatures in the course of a few months, and cut off the bills, figuring them at \$25.00 each, until on reaching



Figure 2. Brown collected more than 120 Masked Bobwhite (*Colinus virginianus ridgwayi*) specimens in southern Sonora, Mexico, in 1905–1906, at a time when fewer than 30 specimens were known.

civilization again, he was chagrined to find his material utterly worthless.

In the early 1920s, Brown again returned to the Sierra Madre in search of these woodpeckers and now found the birds much rarer and proceeded to purchase them from local hunters. L. A. Carlton (1922), who kept a diary of his hunting trip into the Sierra, revealed how high the price had risen: “Saw giant woodpecker today. Rare bird and to be found only in these mountains. His coloring is gorgeous—blue-black, white and red. Very large. Perhaps twenty-four inches in length. The Whettens [J. A. Whetten was the party’s Mormon guide] tell us that some museum or ornithologist recently procured a specimen here by paying \$1500.00 for its capture.”

The only specimens from the early 1920s are four obtained by Brown from the Sierra Madre Occidental in the vicinity of Mound Valley, just south of the Mormon colony of Colonia Pacheco and now at the American Museum of Natural History (Snyder et al., 2009).

Masked Bobwhite

After its discovery in northern Sonora by Frank Stephens in 1884, the Masked



Figure 3. Many of Brown's expeditions were sponsored by John Thayer, including his trip to Sonora, Mexico.

Bobwhite (*Colinus virginianus ridgwayi*) became a much sought after specimen by period naturalists (Stephens, 1885; Allen, 1886). By 1905, the Masked Bobwhite was still known from fewer than 10 specimens from the Mexican State of Sonora, and an equal number from adjacent Arizona Territory, where it had already become extirpated by drought and excessive livestock grazing (Brown, 1989). Brown discovered a population far south of its known range at the boundary of the Yaqui tribal lands in southern Sonora. In December 1905 and January 1906, he collected 120 Masked Bobwhite, nearly 50% of the total number of specimens now in collections (Brown et al., 2012; Figs. 2, 3). Unrest between the Yaquis and the Mexican government prevented any more investigations farther south through the first half of the twentieth century (Spicer, 1980), and Brown's collection area remains the southern boundary of the known historical distribution of this critically endangered bird.

By spring of 1906, Brown was in southern California. His fame was now significant, and his arrival was announced with fanfare in the journal *The Condor* (Anonymous, 1906):

Mr. Wilmot W. Brown, Jr., of Cambridge, Mass., is in southern California for a few month's collecting, having just returned from a successful trip into the Yaqui country of Sonora. He intends to visit some of the Santa Barbara Islands, and if a suitable vessel can be chartered, Guadalupe Island off the Lower California coast. Mr. Brown is famous for his many years of field work in South America, where he has discovered over 100 species of birds, and a great many new mammals. By dint of extreme courage and energy he has penetrated into the most remote districts, discovering such remarkable novelties as the white-tailed hummingbird, from the Santa Marta region, figured in a colored plate in the April, 1899, *Auk*. Mr. Brown's work is pursued wholly thru his love of collecting, tho he works partly in the interests of the Museum of Comparative Zoology at Cambridge, and of Mr. Outram Bangs, the latter gentleman publishing most of the results.

Guadalupe Island (1906)

Brown's interest in visiting remote islands full of unique fauna was still strong. Of all the islands off the western coast of North America, Guadalupe Island, about 160 miles west of Baja California, is a rarity in being an island of volcanic origin that never had any connection to the mainland. As such, it contains no native terrestrial mammals and supports a high degree of endemism in its flora and fauna (Moran, 1996). No fewer than nine endemic bird taxa have been described: Guadalupe Caracara (*Caracara lutosus*), Guadalupe Storm-petrel (*Oceanodroma macrodactyla*), Guadalupe Flicker (*Colaptes auratus rufipileus*), Guadalupe Bewick's Wren (*Thryomanes bewickii brevicauda*), Guadalupe Rock Wren (*Salpinctes obsoletus guadeloupensis*), Guadalupe Ruby-crowned Kinglet (*Regulus calendula obscurus*), Guadalupe Spotted

Towhee (*Pipilo maculatus consobrinus*), Guadalupe Junco (*Junco [hyemalis] insularis*), and Guadalupe House Finch (*Carpodacus mexicanus amplus*). Sadly, only three of these, the Rock Wren, Junco, and House Finch, are still extant, the rest having succumbed to feral cat predation and habitat destruction by feral goats (Quintana-Barrios et al., 2006).

The first ornithological collections from the island were made by the botanist Edward Palmer in 1875. W. E. Bryant provided the first systematic account of the ornithology of the island in 1884 (Allen, 1887). The collectors A. W. Anthony (in 1896) and Rollo Beck (in 1900) had also visited Guadalupe, but the status of the island's declining species was still unclear by the time of W. W. Brown's visit in 1906 (Thayer and Bangs, 1908).

Before departing on the trip, Brown conferred with Frank Stephens, with the San Diego Society of Natural History, who was one of the most experienced collectors in the southwestern United States and had just finished his book *California Mammals* that year (Stephens, 1906). Stephens recommended a colleague of his, H. W. Marsden, to accompany Brown on his island trip. Stephens remarked that Brown "is a peculiar fellow and seems afraid people will find out something about his business" (Stephens, 1906, letter to Swarth).

In May of that year Brown arrived on the island where he was to spend 2 months. His main target was the Guadalupe Caracara, a darkly colored, bold, and aggressive version of the mainland Crested Caracara (*Caracara cheriway*). This species had only been discovered by science after Palmer's visit in 1875. Brown repeatedly set out dead goats and hid nearby, waiting for the Caracaras to appear. As Brown himself relates, a sailor who lived on the island 30 years before had told him that, at that time, these birds were common and were so bold as to swoop down on a freshly killed goat carcass as the goat hunter was still skinning it. However, the

hunters discovered they preyed on the kids and began killing them. An agent on the island made a special effort to shoot them with regularity, and after Palmer's early visit, each subsequent visitor noted fewer and fewer of the raptors. One visiting American goat hunter, aware of the bird's rarity, even went so far as to catch four of the birds alive and bring them to San Diego in 1898, hoping to sell them. They spent some time on display in the front window of a saloon downtown (Abbott, 1933). Brown's extensive efforts to collect the caracaras came to nothing, as the last of the birds were collected by Beck in 1900 (Abbott, 1933). Shortly after Beck arrived, he came across a flock of 11 birds and shot nine of them, failing to come across any others for the rest of his time on the island. Years later, Beck expressed regret that he had contributed to the species' demise, "judging by their tameness and the short time that I was on the island I assumed at the time that they must be abundant" (Abbott, 1933).

Brown (1906) also took note of another hunter busy catching the birds of the island: "Domestic cats in a wild state were numerous, particularly along the northern ridge where the petrels and shearwaters breed. The mortality among the petrels [both Guadalupe and Leach's Storm-Petrel *Oceanodroma leucorhoa socorroensis*] and shearwaters [Black-vented Shearwater, *Puffinus opisthomelas*] must be great for there were hundreds of their wings strewn about, and the wings and feathers of Juncos and Rock Wrens and Woodpeckers [Guadalupe Flickers] were also found. The extinction of (*Pipilo consobrinus*) [Guadalupe Spotted Towhee] was undoubtedly caused by the cats. A woodpecker's nest containing four young ones was robbed by the cats. One fat, sleek feline killed by us contained 13 mice and some feathers in her stomach." The Guadalupe Flickers and Guadalupe Storm-petrels described by Brown were not to be found again by subsequent visitors.

Bangs himself well knew the effect of feral cats, especially on islands. As related in his obituary (Peters, 1933), "One of the incidents of his local mammal trapping that he sometimes referred to was how he and Gerrit Miller saved the Muskeget Island beach mouse (*Microtus breweri*) from extinction. One summer while trapping on Muskeget, they found the island overrun with house cats gone wild, but not a sign of *Microtus*. On a smaller island separated by only a narrow channel, the mice occurred in abundance. He and Miller procured some catnip and either trapped or shot every cat on the main island; they then waded over to the smaller island and caught a large number of mice with which they restocked Muskeget. The following winter, the smaller island was washed away in a storm."

Despite the carnage by feral cats and habitat destruction by goats, the endemic Rock Wren of Guadalupe Island, larger and with a much longer bill than its mainland relatives, was still common. Despite their abundance, the Rock Wrens of Guadalupe had found a trick that even Brown could not surmount: "Once when out hunting, I was standing motionless, when I saw a rock wren nearby, it was too near to shoot for a specimen, so I backed off so as to get a long shot and the wren followed me, so I backed again and sat down, when along it came, jumped onto the toe of my hunting boot and hopped up to my knee with its head on one side looking up into my face with the greatest of curiosity. Needless to write, that wren, and all the other wrens of a like sociable nature are still denizens of Guadalupe" (Brown, 1906).

Brown also found time to collect 85 plant specimens on the island, which now reside in the Gray Herbarium at Harvard University. Upon returning, Brown again conferred with Stephens in San Diego. Stephens later wrote to Harry Swarth after hearing from both Marsden and Brown about their trip: "they returned thoroughly disgusted with one another. I suspect both

were at fault" (Stephens, 1906, letter to Swarth).

Brown's breezy, humorous account of his trip is the only surviving typewritten manuscript apparently authored by him to survive. While providing important details to his observations and collections while on the island, it glosses over an incident that occurred at the end of his trip and portends some of his later actions in regard to rare species. After being picked up by their chartered boat that was weeks late in arriving, Brown and Marsden circled the island looking for two very rare pinnipeds, the Guadalupe fur seal (*Arctocephalus townsendi*), and northern elephant seal (*Mirounga angustirostris*). Both species had been reduced to near extinction over the previous century by sealers harvesting them for oil and hides. Brown found a group of 11 elephant seals on a remote beach and approached in a small skiff. According to Brown:

As we rowed quietly toward the herd we could see that they were all asleep, being stretched out lengthwise on the sand. As we got nearer, one rose colored old male who scented or heard us, raised himself on his flippers and pointing his head upward gave a deep growl, upon which the others rose up with many growls and faced us.

By this time we were within firing distance directly in front of the herd, and close to a dangerous looking surf. As a big swell caught us we seemed to rise and then we dashed forward on the crest of a big comber, there were three shots and the next moment we were cast among eleven now thoroughly aroused, retreating, floundering sea elephants, their jaws snapping and their deep growls mingling with the roar of the surf, which swept in behind wetting us nearly to our shoulders, and filling the boat. As the elephants did not offer to attack, we

finally got our boat up on the beach out of reach of the surf, and then proceeded to make observations We spent two hours with these good natured, harmless animals, most of the time lying in the sand within ten feet of them, but with the exception of one raising his head now and then they ignored our presence. Wishing to see them swim we suffered their displeasure by throwing sand on them and by shouting and waving our hunting bags and hats in their faces, until they seeing more sleep was out of the question were glad to get into the surf. As we rowed back to the ship, we passed several with their heads high and straight out of the water giving them the appearance of treading water The beach, under three thousand feet of perpendicular basaltic cliffs and washed by a heavy roaring surf is truly a wild spot and a fit setting, for probably the last herd of Sea Elephants in North American waters.

Other than firing shots, Brown makes no mention of collecting any seals, and his account differs dramatically from that recollected by Marsden and told to Stephens who related the story in a letter: "They anchored overnight at the southern end of the island. Next day near the north end of the island they saw a group of large seals lying on a little gravel beach at the foot of an immense perpendicular cliff and fired a number of shots at them from the launch. They saw that they had killed two or three and Brown, the Mexican, and the sailor from the launch went ashore through the surf which was very heavy. Brown says the bunch originally consisted of eleven seals. They had killed one huge fellow and a small one on the beach and one large one was dead in the surf. The rest of the bunch still remained on the beach and Brown says he gradually drove them up against the foot of the cliff. They growled and snarled at him but backed off without really showing fight. He got within

eight feet of them! . . . They skinned the small seal. Brown says it was eight feet long and this it was a young one. Quite as likely that it was an adult female. He says the other was so big that he could do nothing with it and come off and left it! They then went back to the anchorage at the south end of the Island. Marsden says he asked Brown why he had not taken the skull of the big one, and that Brown replied that he had not thought of it. Nothing more was said but next morning Brown told the captain to go back there and he went ashore and cut off the head Brown says he measured eighteen feet in length This little band of Elephant Seals is the only one the sailors and people of that region know of and they were on a beach not known to be frequented by them" (Stephens, 1906, letter to Swarth).

One skull of a male elephant seal and the skin and skull of a female elephant seal collected by Brown in 1906 are in the MCZ collection. Despite Brown's actions, the species survived, likely in part because of their extended adolescence period, in which juvenile seals spend several years at sea before becoming sexually mature and returning to their breeding sites. The majority of the individuals in a population are therefore not at vulnerable breeding sites on land at any given time. Subsequent to Brown's visit in 1906, another six elephant seals were collected from Guadalupe Island in 1911 by C. H. Townsend for the American Museum of Natural History, and then another 15 were collected from there in 1913–1914 for the California Academy of Sciences, San Francisco, and the Los Angeles County Museum of Natural History. After this period, protections increased and the population quickly rose. Today the population has risen to more than 200,000 (García-Aguilar et al., 2018).

Baja California (1906)

Brown's forays into Baja California were very successful, both in satisfying the

demands of his sponsors for large series of rare birds and in showcasing Brown's perseverance under trying conditions, coupled with an ambivalence to bird conservation. Shortly after arriving in the cape region of Baja California Sur, he bragged that his collecting was so thorough that the desire for nests and eggs of some rare species by John Thayer of the MCZ might be difficult to fulfill: "It will be a question if I will be able to find the nest and eggs of the Mangrove Yellow Warbler [*Setophaga petechia castaneiceps*] as most of them are in my collection. And this also applies to Frazer's Green Heron [*Butorides virescens frazari*]"—most of them being in my collection" (28 April 1908 letter). While in the cape region, Brown continued to focus on wetland birds, writing "from Miraflores, we took the pack mules to Santiago and camped at the Laguna within fifteen feet of the tules [reeds], and shot Belding's Maryland Yellowthroats [*Geothlypis beldingi*] out of the back door of the tent" (20 Jan 1909 letter). The Belding's Yellowthroat is now considered globally endangered, although primarily from wetland destruction, rather than direct shooting (Rodríguez-Estrella et al., 1999; Erickson et al., 2008; Fig. 4).

In January–March 1909 he traveled up into the Sierra de la Laguna range in southern Baja California (Thayer, 1909a,b). On 26 Dec at El Sauz, he found a Band-tailed Pigeon (*Patagioenas fasciata vioscae*) nest with egg, showcasing how this species can breed on a near year-round basis. Several other Band-tailed Pigeons were found with young chicks. He also further cemented his reputation for finding elusive species that few others could collect in numbers. The Rufous-crowned Sparrows (*Aimophila ruficeps sororia*) is a case in point. This non-flocking sparrow is generally thinly distributed in pairs across arid, often steep, hillsides. Modern birdwatchers rarely see more than a few in a day. In 2 weeks of collecting at El Sauz, he was able to secure 70 Rufous-crowned Sparrows. "They were



Figure 4. Belding's Yellowthroat (*Geothlypis beldingi*) collected by Brown in Baja California Sur, Mexico, in 1912.

not common as about six specimens a day was all I could do" (19 Jan 1909 letter).

Brown also related some of his tricks for securing rare birds in the field: "I found the Mangrove Warbler a rare bird but my previous experience with this species in Panama, the Pearl Islands, and in Yucatan is what made me successful. I learned its song and alarm note in Yucatan in 1893. The first morning I went into the mangrove swamp of La Paz I whistled the song of the Yucatan species and they answered me and this is the secret of my success, for it is very secretive in its habits. I found it so difficult to get that I offered 50¢ a piece for them to the duck hunters and others including the local taxidermist, but they all failed to get it!!" (25 Aug 1908 letter).

Gulf of California Islands (1909)

The Gulf of California, or Sea of Cortez, is dotted with numerous islands of various

sizes, and like islands elsewhere, these host a suite of endemic species. In the spring of 1909, Brown visited several of these islands, with a focal species of his searches being the Craveri's Murrelet (*Synthliboramphus craveri*). The Craveri's Murrelet had been discovered by the Italian naturalist Federico Craveri in 1856, although from which island is an ongoing mystery (Bowen, 2013; Bowen et al., 2015). In 1909, this species' distribution and biology was still little known, and Brown made a concerted effort to locate a breeding colony. He undertook a trip to the islands of San Jose, San Francisco (now San Francisquito), and nearby Roca El Callo. He found a nesting colony in a rocky bluff on El Callo and a small islet and proceeded to collect a series of eggs and skins. "We found the murrelets nesting in the crevices among the rocks of the bluff. The nest in all the instances was a slight depression in the earth at the end of the crevice. Much difficulty was experienced in getting the eggs out of the crevices as some of the crevices were 6 ft. long. Most of the nests contained two eggs, but some of the nests only contained one. The young ones take to the water two days after being hatched! Twenty two days is the period of incubation. The males aid in the act of incubation—many males being taken on the eggs in the day time. In the early morning hours, particularly an hour before dawn, there was much activity among the murrelets, they at this time being seen in pairs."

One pair he collected was notable: "Our tent was pitched at the foot of a bluff and it was almost impossible to sleep the murrelets made so much noise, for when they fly there is a sharp, loud whirring sound. Towards the end of our stay they learned that the wall of our tent was soft and seemed to take a delight in butting into it in their amorous [sic] frolics. One couple in the excitement of the moment must have hit it head on, for they dropped to the ground with a thud and fluttered together under the side of our tent into my bed, which made

me sit up and take notice. I caught them by throwing a blanket over them. This is the first collecting I have done in bed" (10 March 1909 letter).

Brown also visited several islands in the southern Gulf, in search of the recently described Heermann's Gull (*Larus heermanni*). He finally found a nesting colony on the small Isla San Ildefonso, just east of Bahía Concepción. There he found approximately 15,000 pairs, and proceeded to collect 610 sets of Heermann's Gull eggs, an egg never before collected (Thayer, 1911). Today, over 90% of the global population of Heermann's Gull nest on Isla Rasa, east of Bahía de Los Angeles, in the Gulf of California. The population at San Ildefonso was estimated at 200 individuals in the early 1990s (Velarde and Anderson, 1994) but declined to zero by 2000 (Mellink, 2001). The reasons for the vast decrease in the population size at San Ildefonso since Brown's day are unknown, but the establishment of a lighthouse and its popularity among fishermen may have increased the disturbance level and discouraged nesting gulls. The population of Isla Rasa rose significantly after the establishment of a bird refuge on the island in 1964 (Anderson et al., 1976).

Sierra de San Pedro Martír

In the fall of 1909 Brown headed to the Sierra de San Pedro Martír, in the northern half of the Baja California peninsula, in search of the endemic subspecies of Mountain Quail (*Oreortyx pictus confinis*) residing there. "I had much difficulty in collecting them on account of the mountain fires which oblidged [sic] us to move our camp five times—we had two narrow escapes . . . the Partridges [Mountain Quail] were scared away by the fire and smoke of the burning pine forest. In fact at one time it looked as if the trip was doomed to failure as the mules got frightened and ran away . . . we did not see any Condors, the mountain

fires probably made them seek other parts." However, he was proud to report collecting two pronghorn (*Antilocapra americana*) during the trip (10 Dec 1909 letter).

Brown did express concern about the hunting practices he encountered in his travels, although often for the negative effects they had on his collecting rather than any larger concern for the plight of dwindling resources. Near Mexico City in the summer of 1910, while the capital was preparing for their centennial celebration of Mexican independence on 16 Sept, Brown complained that "the large haciendas make a regular business shooting ducks for the market, but instead of hunting them with double-barreled shot guns, they use (armadas) *batteries* and sometimes kill at one discharge four or five boatloads!!"

Conditions in Mexico during this time were also changing in ways that would affect Brown's travels. "There is a revolution here and several trains have been held up in Chihuahua . . . in Chihuahua there has been heavy fighting and many have been killed. And several hundred wounded soldiers arrived here a few days ago from the front . . . There is a strong anti-American feeling here and a demonstration against Americans (according to old timers here) is liable to break out at any time. Last month there was an anti-American demonstration by the students in Mexico City . . ."

As the Mexican Revolution spread across the country, Brown left Mexico in the spring of 1911 for a new adventure in the Cayman Islands.

GRAND CAYMAN (1911)

His collecting trip to Grand Cayman in 1911 can only be described as scandalous: "I shall not leave Grand Cayman Island until the Governor of this island receives permission for me to collect from the Governor of Jamaica. And as the Governor has been informed by English Naturalists that many of the resident or 'species

peculiar to the Cayman Islands are nearing extinction' I am afraid his answer will be unfavorable to us. At any rate this is what the Governor of this island thinks!" (15 May 1911 letter).

Brown did not let permit problems stand in the way of his collecting however: "I am now located in a remote part of the island which I selected after looking over the Island thoroughly by canoe and horse. And I have beyond doubt selected the best locality for collecting the birds 'peculiar to Grand Cayman' on the island. And last, but not least, it is quite distant from the Government House and out of range of the inspector."

His choice of campsite was indeed a successful one:

Have made a fine collection—particularly of the rare things you want so much. Have taken six fine specimens of the very rare *Icterus bairdi* [Jamaican Oriole (Grand Cayman), *Icterus leucopteryx bairdi*—this species is on the verge of extinction! Of *Mimorichla ravidus* [Grand Cayman Thrush, *Turdus ravidus*] which is as rare as Baird's Oriole [*Icterus leucopteryx bairdi*] I took eight fine specimens. It is not only very rare, but very hard to find as it is very secretive in its habits. Ten years ago this species was quite common, but it now appears to be on the verge of extinction! I have been told that the Naturalists who have visited Grand Cayman of late years made a special hunt for both the Thrush and the Oriole, but failed to find a single one!

Brown blamed the rarity of the thrush on two exotic species: "this rare thrush which is without question on the verge of extinction due to the ravages of domestic cats in a wild state that overrun the island, and to the fire ants which kill the young birds in the nest" (16 Sept 1911 letter).

"Of *Spindalis* [Western *Spindalis* (Tanager), *Spindalis zena*] and *Melopyrrha taylori* [Cuban Bullfinch, *Melopyrrha nigra*], I

have a fine series of each. Also a nest and egg of *Melopyrrha*. Of the other rare things, I have taken a fine series of each."

He further describes his exploits in a 4 July 1911 letter: "Collection contains 17 specimens of the very rare *Icterus bairdi*—the rarest bird I ever hunted!"

Brown's exploits had made news around the island, and the Governor specifically forbade Brown from collecting any birds "peculiar to the island However my collecting blood was up by this time, so hiding what I had already collected, I went on collecting just as if the Gov. of Jamaica and the Gov. of Grand Cayman had never been heard from."

Of the birds Brown collected, the Grand Cayman Thrush is now globally extinct, Brown being the last one to collect it. The Cuban Oriole still survives on Cuba, but Brown was the last to collect it on Grand Cayman where it is now extirpated. These species were likely doomed to extinction anyway because of ongoing habitat loss as the remnant forests of the island were being cleared, as well as predation by exotic species as Brown relates, but his apathy to their plight and desire to collect every last one, while common among both the scientific community and the general public, is a sad reflection of the mores of the time. The last Passenger Pigeon, once the most abundant bird in the world, was soon to die in a zoo in 1914. Mores were changing, however, as the Migratory Bird Treaty Act, protecting the direct killing of birds and destruction of nests, was signed 2 years later.

Bangs' 1916 publication on Brown's collecting trip to Grand Cayman gives cover to Brown's actions that certainly are not borne out in his letters of the time. Bangs writes: "The Thrush is now extremely rare and local in Grand Cayman. Brown covered the whole island and found it only in two remote patches of woodland. Each of these tracts of rather heavier forest than is usual in the island now-a-days was inhabited by a

few pairs of thrushes, which Brown believes to be the entire population of the island. In each of these woods Brown was careful to leave birds enough to perpetuate the species, if it is not gradually becoming extinct from some natural cause, as seems to be the case.”

Bangs seems to have been concerned about the public reaction to Brown’s collecting such endangered birds. Brown never mentions being “careful to leave birds enough to perpetuate the species.” Brown himself stated that the thrush “appears to be on the verge of extinction!” (15 May 1911 letter).

Johnston (1969) relates an interview with an elderly resident of Grand Cayman who recalled Brown’s collecting efforts, “Still living at Old Man Bay, Mr. Whittaker clearly recalled his experiences ... when W. W. Brown sailed around to Northside from Georgetown and remained in the home of Willie Tatum for several weeks during which time Brown paid the small boys one dollar apiece for bird specimens. Mr. Whittaker helped his brother collect the thrushes and other species with slingshots. At that time the thrushes were, according to Mr. Whittaker, conspicuous, noisy, and common where timber was being cut about 3/4 mile inland from Northside.”

UNITED STATES (1911–1922)

Brown then shifted his focus back to the United States, spending the years from 1912 to 1922 collecting in various U.S. locations, including California, Arizona, and Alaska. In Alaska in the summer of 1915, he collected more than 300 bird specimens for the MCZ. In California, he wrote to eminent naturalist Joseph Grinnell for help in obtaining collecting permits: “the Audubon society has made collecting in California very difficult, and one has to have a gilt edged recommendation now days to get a permit to collect birds” (22 Sept 1912 letter). Brown spent significant time in Arizona

during this period, collecting almost 2,000 specimens of birds, mammals, and reptiles all across the state. Traveling to the Huachuca Mountains of Arizona in 1917 to collect birds in that important area, Brown befriended a young Ed Jacot, then newly arrived in the state and who would go on to make many important bird discoveries, especially in the lives of nocturnal birds. Brown taught Jacot to make proper bird specimens, a skill Jacot later shared with others, including another young transplant to the state, Allan R. Phillips in the 1930s (Phillips, 1977).

Brown appears to have married sometime between 1916 and 1918, as the pronouns in his letters to Bangs and Thayer change from “I” to “We” and he begins mentioning “Mrs. Brown” when ending his letters. He remains married until his death, as several visitors in his later years remark on visiting Brown and his wife after they settle in Chilpancingo, Guerrero, Mexico, in 1931 (Sibley, 2010).

RETURN TO MEXICO (1922–1953)

Brown returned to Mexico in 1922 where he spent the next 30 years collecting, although ironically it is in this period of his life that we have the slimmest record of his exploits. In 1922–1925 Brown spent extensive time in the Sierra Madre Oriental in San Luis Potosí, Tamaulipas, and Veracruz. While in Veracruz Brown collected 38 Sumichrast’s Wrens (*Hylorchilus sumichrasti*), of 55 total in museum collections today (Bangs and Peters, 1927).

Before 1920, fewer than 10 specimens of Worthen’s Sparrow (*Spizella wortheni*) were known. This included the original type specimen from Silver City, New Mexico, in 1884; an 1893 specimen from Puebla, Mexico, and an 1888 specimen from San Luis Potosí, Mexico. Six specimens had been collected by Nelson and Goldman in 1898 in the Sierra Madre Oriental of Tamaulipas, in a town called Miquihuana.



Figure 5. Worthen's Sparrow (*Spizella wortheni*) collected by Brown in Miquihuana, Tamaulipas, Mexico, in 1922.

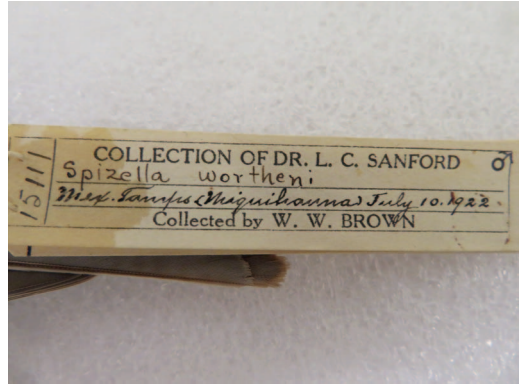


Figure 6. Worthen's Sparrow specimen tag.

Brown travelled to Miquihuana in 1922 for the American Museum of Natural History and took 24 Worthen's Sparrow specimens (Figs. 5, 6). Not to be outdone by a rival institution, Thayer sponsored Brown to return to the site in 1924 and Brown took another 53 specimens and 25 egg sets of Worthen's Sparrow. A triumphant Thayer quickly published a paper on the collection and the only description of nesting of the species then available (Thayer, 1925).

Because the Worthen's Sparrow has never been found as far north as New Mexico since its discovery there in 1884, the Silver City specimen collected by Charles H. Marsh represents a mysterious anomaly. However, Hubbard and Dove (2013) found Marsh's field notes and other specimens consistent with his residency in Silver City at that time. Numerous other grassland-dependent bird species were extirpated from southeastern Arizona and southwestern New Mexico by 1900, owing to severe drought conditions and widespread overgrazing, resulting in millions of livestock deaths and barren landscapes devoid of grass (Bahre, 1991; Clark, 2019). Species extirpated, or nearly so, in this period include such grass-dependent species as the Masked Bobwhite, Rufous-winged Sparrow (*Peucaea carpalis*), Botteri's Sparrow

(*Peucaea botterii*), and Aplomado Falcon (*Falco femoralis*; Phillips et al., 1964). Therefore, the idea that a population of grassland-dependent birds could have been extirpated from New Mexico by 1900 is consistent with the landscape conditions of the time.

In 1954, Webster and Orr (1954a) published a description of a new subspecies of Worthen's Sparrow named for Brown: "*Spizella wortheni browni*—The new race is named in honor of the late Wilmot W. Brown, who collected so much of the valuable material of Mexican birds now in several museums, including a majority of the above-listed specimens of *S. w. wortheni*."

Although Brown is best known for his bird and mammal collecting, he made important contributions to herpetology in his travels as well. In total, Brown collected more than 1,800 reptile and amphibian specimens in Mexico. In 1939 he collected 253 reptile and amphibian specimens alone in Guerrero, all now in the Field Museum of Natural History (Chicago). In 1942 he collected another 282 reptile and amphibian specimens in Guerrero, now in the Museum of Vertebrate Zoology (MVZ) at the University of California (U.C.), Berkeley.

One example of the future value of some of these specimens is the large series of

what is now known as the largenose earth snake (*Conopsis nasus*). Greer (1966) used Brown's collected specimens to determine the breeding season of this species: "The Museum of Comparative Zoology, Harvard University, has a collection of 104 *Conopsis nasus* (MCZ 19040–19043, 47501–47600) from Alvarez (elev. 7,500 to 8,000 ft.), San Luis Potosí, Mexico. The collection was made by W. W. Brown during October and November 1923. Twenty-two females were determined to be gravid and were opened for inspection ..." (Greer, 1966).

Brown also collected reptiles on his first trip abroad to the West Indies in 1891–92. Among the specimens he collected was a single individual of what is now known as the Mona Boa (*Chilabothrus* [*Epicrates*] *monensis*) then unknown to science. The Mona Boa is now a threatened species protected under the U.S. Endangered Species Act. Brown also collected what became the type specimen of the Puerto Rican racer (*Borikenophis* [*Dromicus*] *variegatus*; Schmidt, 1926).

Brown also made significant mammal collections. In 1922, in the vicinity of Miquihuana, Tamaulipas, he collected a bat that proved to be a new genus. The skin and skull arrived in such good condition that from this one specimen a new genus and species were described as Allen's big-eared bat, *Idionycteris mexicana* (now *I. phyllotis*; Anthony, 1923).

Brown collected the type specimens of a number of other mammals, including the San Miguel rabbit (*Sylvilagus brasiliensis incitatus*) and the rufous tree rat (*Diplomys labilis*) both first collected by Brown in 1900 on San Miguel Island in the Las Perlas Archipelago (Bangs, 1901a; Thayer and Bangs, 1905).

By 1931 Brown had settled down in Chilpancingo, Guerrero. This locality, situated at 4,000 ft elevation at the eastern base of the Sierra Madre del Sur, was likely chosen as one with an agreeable climate and with close access to high elevation forests



Figure 7. *Micrurus browni* type specimen from the Field Museum of Natural History, Chicago.

that had been poorly explored for specimens (Gadow, 1908). A favored nearby collection locale was Omilteme (sometimes spelled Omiltemi), a locality 20 km west of Chilpancingo at more than 7,000 ft elevation. Over the next 20 years, Brown collected more than 1,400 bird specimens from Omilteme and an additional 6,600 from Chilpancingo. He also stayed active collecting mammal, reptile, and amphibian specimens. In 1939 he collected a new coral snake (now *Micrurus browni*) from Chilpancingo (Fig. 7).

Outram Bangs died in 1932, and the following year Brown's longtime benefactor John Thayer passed away as well (Peters, 1933; Phillips, 1934). Despite this setback, Brown was able to find other benefactors in North American museums and continued collecting. In fact, after 1933, Brown

collected more than 12,000 specimens of birds, mammals, reptiles, and amphibians, selling them to various collections. More than 2,000 specimens went to the Moore Laboratory of Zoology at Occidental College, Los Angeles, California, mostly in the late 1930s. Nearly 2,000 more went to the California Academy of Sciences between 1949 and 1952 (Webster and Orr, 1954b). The bulk of his collecting efforts during this period, more than 6,600 specimens, were sold to Milton Ray, who later donated the majority of the collection to the MVZ from 1938 to 1944.

Brown died in Chilpancingo in 1953 in the company of Chester Lamb, himself a veteran bird collector throughout Mexico, who collected the last Imperial Woodpecker specimens in 1947 (Davis, 1974).

DISCUSSION

Although he never authored a paper himself, Brown was a prolific letter writer and maintained correspondence with many different researchers throughout the United States. Despite his accomplishments and contributions to ornithology, no obituary of Brown was ever published in an ornithological journal, probably because he outlived his chief benefactors whose careers were built on analyzing specimens Brown collected.

Charles Sibley (2010) describes visiting Brown on separate trips to Guerrero. In 1941 he visited Brown in Chilpancingo, where Brown and his wife, both elderly by this time, rented a couple of rooms in town at the Hotel Mexico. "He could no longer collect in the field, but he bought specimens from young men who brought them to his window on the street. He made beautiful skins and let us watch him. He had metal troughs of various sizes in which the completed specimen was laid, then wrapped with thread. This produced the round-backed specimens for which he was known" (Sibley, 2010: 278).

Sibley again arrived in Chilpancingo in 1946 and visited the Browns at the hotel where they had been now for 9 years. Mrs. Brown was ill and did not recognize Sibley or his party (Sibley, 2010: 248).

Even late in life Brown was an inveterate collector able to penetrate topography and conditions few others could. In 1940, when Brown was 70 years old, he collected a new species of vireo [*Neochloe (Vireo) brevipennis browni*] in Guerrero from an area that was relatively unexplored:

My specimen was taken at 4000 feet altitude in the mountains near Chilpancingo, Guerrero, Mexico. The locality was a very remote part of a wild, deep canyon where hunter's feet have seldom trod, for this region has the reputation of being extremely rough and precipitous. The bird was collected on the steep slope of the canyon from the top of a tall tree standing among surrounding scattered pines. In foliage the tree had leaves and tiny blossoms scarcely different from the tree you have in California called the Rum or Choke Cherry. It happened at the particular time that I was ensconced in a niche in the canyon-wall watching the opposite side for a possible *Amaur-ospizopsis relictus* [Slate-blue Seedeater], when two small birds, similar in color, form, size and flight, flew by. Flying closely together they lit simultaneously on the tree-top. Presumably they had been down to the river in the valley, far below, to drink, and returning, had perched to rest prior to continuing their journey up the canyon. Peculiarly there was no water in the higher mountains on this particular date although it was during what is known here as the rainy season. On alighting, both birds had disappeared in the foliage at the top of the tree, which was well up on the other side of the canyon. But presently one of them emerged so that it was silhouetted against the sky. It appeared out of gun-

range but I decided to try; so putting in a three inch shell I fired and to my astonishment the bird fell. As the locality where the tree grew was very steep, I was a long time reaching it, being obliged first to find a place that I could successfully climb. On arriving at the foot of the tree I saw my bird lying at the bottom of a drop-off, ten feet below, in a shady spot on a bed of leaves. On reaching this ledge, as I stooped to pick the bird up, I thought "it's a *Basileuterus*" [Rufous-capped Warbler], but when I opened my hand and saw the strange white eyes and the peculiar coloring of the underparts I realized at once that I had taken a bird that was new to me. (Miller and Ray, 1944)

Miller and Ray (1944) summarize nicely what made Brown such a successful collector, "Brown's notes also show that the taking of the lone specimen of *Neochloe [Vireo] brevipennis browni* was dependent on three fortunate factors: favorable weather conditions during the rainy season, continual combing of a wide area of precipitous mountain-sides by a tireless and long-experienced field ornithologist, and lastly extremely good marksmanship on the part of Mr. Brown himself."

Brown was a talented naturalist. He mentions in various places his skill at imitating bird calls. On Guadalupe Island he was adept at calling in Guadalupe Juncos to within inches of his face, which became a favorite amusement of his.

In an era of commercial collecting with great competition among curators to describe new forms, prices for specimens were influenced as much by the location of the specimen as by the particular species collected, with islands and other isolated locales potentially full of endemics greatly prized. In this atmosphere there was strong incentive to falsify the location of specimens. Joseph H. Batty sold a number of bird and mammal specimens with erroneous

locality data to Walter Rothschild at inflated prices (Olson, 2008). Richard Meinertzhagen stole specimens collected by others and relabeled them as his own from new locations (Knox, 1993; Rasmussen and Collar, 1999). However, an analysis of falsified collection localities in Mexico by Peterson et al. (2004) found that Brown's localities were supported by logical travel itineraries at least 98% of the time, the highest of the four "mega-collectors" that they analyzed.

In modern scientific discourse as well as popular culture, it has become fashionable to downplay the value of specimens, or even actively to oppose their collection, with the thought that modern research techniques such as banding studies, genetic testing, stable isotopes, and other nonlethal methods can completely replace lethal collection of specimens. However, specimens represent a permanent record of a species as it occurred in a particular place and time, and museum collections are devoted to preserving these collections for science in perpetuity. It remains to be seen how novel data sets that are not based on physical specimens are to be maintained through time so that researchers generations from now can access them. A prime example of the value of collections through time is the current effort to resurvey field sites throughout California first systematically sampled by Joseph Grinnell more than 100 years ago. The Museum of Vertebrate Zoology, where most of Grinnell's specimens, site photographs, and field notes are housed, in conjunction with other institutions such as the San Diego Natural History Museum, are resampling the same field sites with both historical and modern methods. His collected specimens, often consisting of dozens to hundreds per site, offer a benchmark with which to compare modern specimens. As taxonomy changes and species are split and recombined, specimens allow us to know exactly what occurred at a field site originally, with their intact genetics and mor-

phology available for study, without having to interpret field notes and all the name changes that have occurred since then.

Today's collectors are strictly regulated in terms of both which species can be collected and how many, but more importantly, modern day collectors, many of whom have dedicated their careers to conserving rare species, would not conduct any research that did not further conservation efforts, even if such research resulted in harm to individuals, as many nonlethal techniques also do.

W. W. Brown's collections in Mexico, the southwestern United States, and Central and South America laid the foundation for understanding the biodiversity and distribution of vertebrate species in the New World. Without collectors and their benefactors, whether museums, universities, or wealthy individuals, much of this biodiversity would have gone unrecorded until decades later, and many species documented by Brown and others and preserved in museum collections would have quietly gone extinct, whether because of habitat destruction, feral cats, or other mechanisms,

and the lessons of these extinctions would be unknown to conservationists today.

ACKNOWLEDGMENTS

The bulk of Brown's letters are maintained in the Ernst Mayr Library of the Museum of Comparative Zoology at Harvard University. Thank you to Dana Fisher for facilitating access to these letters. Letters were also accessed at the Museum of Vertebrate Zoology at U.C. Berkeley and the Natural History Museum, London (BMNH). Thank you to Stanley Heckadon-Moreno for correspondence about Brown's travels in Panama. The manuscript was vastly improved through discussions and reviews by David E. Brown, James Hanken, and one anonymous reviewer. Eric Mellink provided context about Brown's travels in Baja California. Janet Hinshaw at the University of Michigan Museum of Zoology provided access to documents in that library and the Brown photo. Christopher Swarth provided access to the Frank Stephens letter to Harry Swarth from the Swarth family collection.

APPENDIX 1. COMPENDIUM OF KNOWN W. W. BROWN CORRESPONDENCE.

Date	To	Written from	Housed at	Notes
2 Aug 1895	Outram Bangs	Somerville, Massachusetts	MCZ	Introduction to Bangs, asks for employment; wants sponsor for trip to South America.
20 Oct 1895	Outram Bangs	Somerville,	MCZ	Offers to sell mammal collection.
16 Mar 1896	Outram Bangs	Somerville, Massachusetts	MCZ	Offers to travel to South America for \$250 in gold. Mentions Colombia's Cordillera Oriental. Mentions Mr. Merriam and a "skull scheme."
8 Dec 1896	Outram Bangs	Savannah, Georgia	MCZ	On break during voyage. Mentions Eastern Screech-owl landing on boat near Philadelphia.
23 Dec 1896	Outram Bangs	Haides, Georgia	MCZ	Collecting in Georgia. 125 specimens. Notes the mammal genera.
12 Jan 1897	Outram Bangs	Savannah, Georgia	MCZ	Collecting mammals near Augusta. Also salamanders. 119 specimens. Asked for \$100 advance.
16 Jan 1897	E. A. Bangs	Savannah, Georgia	MCZ	Requests \$100 advance. Mentions he wrote to his brother.
25 Jan 1897	Outram Bangs	Savannah, Georgia	MCZ	Again requests \$100. Mentions catching a mink.
1 Feb 1897	Outram Bangs	Savannah, Georgia	MCZ	Says he received \$150. Shipped 118 specimens.
	Outram Bangs	Ossabaw Island, Georgia	MCZ	Shipped 120 specimens from Montgomery. On to St. Catherine's Island.
28 Feb 1897	Outram Bangs	Savannah, Georgia	MCZ	Shipped 200 specimens. Trapped Ossabawa and St. Catherine's Island for mammals.
16 Mar 1897	Outram Bangs	Darien, Georgia	MCZ	Plans to ship 152 mammal and 25 bird specimens. Requests \$100.
17 Mar 1897	E. A. Bangs	Darien, Georgia	MCZ	Requests \$150. Notes wildflower and herps active.
25 Mar 1897	E. A. Bangs	Barrington, Georgia	MCZ	Received \$100; 100 mammals collected.
16 Apr 1897	E. A. Bangs	Fernandina, Florida	MCZ	Shipped 100 mammals. Also collected 100 mammals and 50 birds from Cumberland Island.
19 Apr 1897	E. A. Bangs	Jacksonville, Florida	MCZ	Had to leave Fernandina, Florida, at midnight to avoid fines for poaching—left traps behind. Shipped 100 mammals from Altamaha Swamp. Requests \$100 for expenses.
29 Apr 1897	Outram Bangs	Jacksonville, Florida	MCZ	Describes mammals caught at Cumberland Island. Could not collect at Jekyll Island due to game wardens.
10 May 1897	Outram Bangs	Jacksonville, Florida	MCZ	Talks of plans to get job as surveyor or sail to South America or Mexico. Back to Boston at last resort. Annoyed at not being answered from 29 April letter.
14 May 1897	Outram Bangs	Jacksonville, Florida	MCZ	Responds to letter of 11 May. Agrees to return to Boston to work on cleaning skulls previously sent. Explains poor conditions in field led to poor condition of skulls. Requests \$25.
21 Nov 1897	Ernest Hartert	Somerville, Massachusetts	BMNH	Offers to travel to Colombia from Venezuela to avoid competing with Cherrie; suggests price of \$0.75 per skin.
15 Dec 1897	Outram Bangs	Barranquilla, Colombia	MCZ	"I arrived at Colombia this morning after a long and tedious voyage". Warned to leave the country due to revolution. "I came to South America to make a collection and will accomplish what I came for or die in the attempt."
29 Dec 1897	Outram Bangs	Santa Marta, Colombia	MCZ	Reached collecting grounds. Offers all collections to Bangs for \$110 per month. Has collected 150 birds. Mentions both Cory and Tring would be interested in collections.
08 Jan 1898	Outram Bangs	Santa Marta, Colombia	MCZ	Collected 42 mammals. Living with Indian tribe. Requests \$150 now and \$110 per month. "Kindly drop my father a postal card that I am in good health." Mentions Hartert working for Rothschilds and will pay good money for specimens.

APPENDIX I. CONTINUED.

Date	To	Written from	Housed at	Notes
22 Feb 1898	Outram Bangs	Santa Marta, Colombia	MCZ	Will ship three cases of birds and one case of birds and mammals. Claims "Ting Zoological Museum" will pay \$0.75 per specimen and wants \$550 for whole lot. Discusses problems measuring elevations. Requests barometer. Discusses other collectors in area working for American Museum and Rothschilds. 801 mammals and birds sent.
15 Apr 1898	Outram Bangs	Rio Hacha, Colombia	MCZ	Just spent 5 weeks in Sierra Nevada Mtns. Discusses "Arguacos" [Arhuacos] Indians. Requests \$150. Two jars of reptiles and snakes and 40 birds.
18 Apr 1898	Ernest Hartert	Rio Hacha, Colombia	BMNH	Annoyed at not receiving response from Hartert. Has collected butterflies and moths at 9,000 ft in Sierra Nevada Mtns.
21 Apr 1898	Outram Bangs	Rio Hacha, Colombia	MCZ	Sent one case of mammals, one of birds, and one of reptiles. Discusses impending war in Colombia and fighting in Venezuela. Asks about war between Spain and U.S. "My return to U.S. next month depends on certain matters at home."
25 Apr 1898	Outram Bangs	Rio Hacha, Colombia	MCZ	Collected over 1,300 birds and mammals from Sierra Nevada. Needs money.
28 Apr 1898	Outram Bangs	Rio Hacha, Colombia	MCZ	Annoyed at not receiving money or letter. "Please write my folks that you have received word from me and that I am OK."
29 Apr 1898	Outram Bangs	Rio Hacha, Colombia	MCZ	Annoyed not receiving letter or money. "Please write my father W. W. Brown that I am OK and have not received any letters from home for over 60 days."
5 May 1898	Outram Bangs	Rio Hacha, Colombia	MCZ	Just received letter of 31 March. Check for \$150 enclosed. Professor Smith of American Museum has arrived with family for collecting. Requests \$150. "Write my folks that I am ok."
29 Jun 1898	Outram Bangs	Somerville, Massachusetts	MCZ	Unclear year of letter. Short confusing note: "Dear Mr. Bangs, Will you kindly inform me when Wilnot W. Jr will be home. I understood him to say that he would be home the 10th of June . . . yours truly W. W. Brown." Side bar: "my health is failing me fast."
25 Jul 1898	Outram Bangs	Rio Hacha, Colombia	MCZ	Written by his father? Likely 1898. Received \$100. 300 birds, 106 reptiles, and 500 butterflies collected. "Mr. Herbert Smith of the American Museum is here with a large party of collectors." Requests \$200. "I have received letters that my father is ill . . ." "Please pay to my sister Annie \$200 for she must need it as doctor's bills are expensive." "There is no business for me at home and money must be earned to support my father during his illness."
15 Jan 1899	Outram Bangs	Rio Hacha, Colombia	MCZ	Just arrived. Leaving for Sierra Nevada that afternoon.
20 Feb 1899	Outram Bangs	Rio Hacha, Colombia	MCZ	Collected in Sierra Nevada from 3,000–11,000 ft. Requests \$300. Met Mr. Nicholas from American Museum who claimed to have government concession for all Indian mounds and their contents.
4 May 1899	Outram Bangs	Rio Hacha, Colombia	MCZ	Shipping 1,400 birds and mammals. Requests gun barrel. Requests long list of firearm supplies and cotton and naphthalene.
	Outram Bangs	Rio Hacha, Colombia	MCZ	34 birds and 19 mammals shipped. Bought large mammals from a hunter. Almost lost collection in storm while in canoe. Requests \$110 monthly.
13 Aug 1899	Outram Bangs	Rio Hacha, Colombia	MCZ	Shipped 334 birds, 24 mammals, 39 reptiles from San Sebastian. Rode mule back for 40 miles. Difficulty in finding mules. Birds moult in July and August and so are in poor plumage. Collected a rattlesnake at 6,600 ft elevation.

APPENDIX I. CONTINUED.

Date	To	Written from	Housed at	Notes
24 Jan 1900	Outtram Bangs	David, Chiriquí, Panama	MCZ	Sent 11 cases containing 1,183 stuffed bird skins and 61 mammals. 58 days collecting near Divalá. Describes habitat in Panama.
4 Apr 1900	Outtram Bangs	Colon, Panama	MCZ	700 birds shipped. Lost 40 skins to a hungry pig. Millinery trade supplying French collectors with bird skins.
28 Jun 1900	Outtram Bangs	Boston, Massachusetts	MCZ	New address in Boston. "Old address is no good." "Obliged to return home on account of the state of things in Panama."
13 Aug 1900	Outtram Bangs	Boston, Massachusetts	MCZ	"I am ready to go back to South America." "The revolution in Panama is at an end."
23 Aug 1900	Outtram Bangs	West Medford, Massachusetts	MCZ	Leaving by train.
28 Aug 1900	Outtram Bangs	West Medford, Massachusetts	MCZ	Visited MCZ today. Preparing for trip.
2 Sep 1900	Outtram Bangs	Boston, Massachusetts	MCZ	Almost ready for trip.
2 Oct 1900	Outtram Bangs	Panama	MCZ	Arrived day before yesterday. Revolution gaining strength. Will leave for Chiriquí at once.
10 May 1901	Outtram Bangs	David, Chiriquí, Panama	MCZ	Shipped 15 cases of 1,190 birds, 338 mammals. Collected at Boquete and up volcano to 8,000 ft. Describes geography and climate. Plans trip to Coiba Island. Requests egg blow pipe.
7 Jul 1901	Outtram Bangs	David, Chiriquí, Panama	MCZ	Reached summit of Mt. Chiriquí, first person to do so; 11,500 ft above sea level. Has not heard from Bangs since Dec 1900.
20 Jul 1901	Outtram Bangs	David, Chiriquí, Panama	MCZ	Stopped collecting in the rainy season and birds molting. Plans to return to U.S.
4 Sep 1901	Outtram Bangs	Boston, Massachusetts	MCZ	Eleven-page journal entry or unaddressed letter. Undated. Discusses conditions and habitats on route to top of Mt. Chiriquí. Mentions dominant birds at each elevation.
19 Sep 1901	Outtram Bangs	Somerville, Massachusetts	MCZ	Ready to return to Panama. Information on sloth and opossum from Panama.
3 Dec 1901	Outtram Bangs	Colon, Panama	MCZ	Preparing for leave. List of requested supplies.
27 Jan 1902	Outtram Bangs	Ceiba, Honduras	MCZ	Smallpox and yellow fever epidemic. Stuck in quarantine. Fighting in region. Will stop collecting and wait for calm.
10 Mar 1902	Outtram Bangs	Ceiba, Honduras	MCZ	500 specimens to send. Difficult conditions. Mr. Batty is collecting at Boquete. Mad at Batty for encroaching. Says Batty spends all day stuffing while assistants hunt and skin.
26 Mar 1902	Outtram Bangs	New Orleans, Louisiana	MCZ	Batty is collecting "wholesale" to make up long series of specimens.
10 Apr 1902	Outtram Bangs	Panama	MCZ	Made collection of 325 specimens. Very difficult conditions. A quarantine to begin 1 April.
11 Sep 1902	Outtram Bangs	Somerville, Massachusetts	MCZ	Left Honduras ahead of the quarantine. Plans to return to Panama soon.
19 Feb 1903	Outtram Bangs	Cambridge, Massachusetts	MCZ	Panama City in state of revolution. Soldiers in streets. Will try to get job at mining company and wait out war.
				Returned to U.S. to escape fighting.
				Working for Batchelder preparing skulls.

APPENDIX 1. CONTINUED.

Date	To	Written from	Housed at	Notes
21 Jul 1903	Outram Bangs	Cambridge, Massachusetts	MCZ	Looking for trip sponsors. Two are interested but want to send him to Siberia or Spain. Sorry that Bangs has lost money.
3 Aug 1903	Outram Bangs	Cambridge, Massachusetts	MCZ	Wanting to go to Orinoco.
15 Aug 1903	Outram Bangs	Cambridge, Massachusetts	MCZ	Received letter today. Proposes trip for \$1,560/yr plus expenses of \$1,000. Says the Rothschilds want him to collect for them.
4 Sep 1903	Outram Bangs	Cambridge, Massachusetts	MCZ	Trying to raise money for trip to Sierra Negra near Rio Hacha. Times are tough for everyone financially.
26 Oct 1903	Outram Bangs	Cambridge, Massachusetts	MCZ	Offers Heath Hen for purchase.
4 Sep 1904	Outram Bangs	Cambridge, Massachusetts	MCZ	Received check from Thayer. Preparing for trip to South America when rains are over.
30 Jul 1906	Frank Stephen to Harry Swarth	Massachusetts	Swarth Family	Frank Stephens to Harry Swarth regarding W. W. Brown trip to Guadalupe Island.
11 Sep 1906	Outram Bangs	San Diego, California	MCZ	Presents typed report on birds and mammals of Guadalupe, Cerros, Natividad, and San Benitos in spring of 1906. Visiting cousins in Pasadena. Mentions staying with Mr. Geo. Lunt in Colonia Pacheco, Chihuahua, last Nov (1905).
12 Sep 1906	Outram Bangs	Pasadena, California	MCZ	Postcard of men in rowboat battling waves. "While with the sea elephants, the sea became so rough"
12 Jul 1907	Outram Bangs	Los Angeles, California	MCZ	Deciding whether to return to Baja or head back to eastern U.S. Enjoying visiting with cousins, "and having a bully time."
	Outram Bangs	La Paz, B.C.S., Mexico	MCZ	Undated letter. Likely April 1908. Very similar to 28 April 1908 letter to Thayer. Has collected several Clapper Rails in mangroves at high tide. "The Frazer's [sic] Heron is a rare bird in this region now as most of them are in my collection, so it will be difficult for me to find a nest. This also applies to the Mangrove Warbler (Yellow Warbler)—the most of them being in my collection. I have literally combed this region in collecting the Mangrove Warbler and the Frazer's Heron." Four or five sets of eggs of Little Ringed Plover (Wilson's) collected at Pichilingue Island, 7 mi from La Paz.
25 Apr 1908	John Thayer	La Paz, B.C.S., Mexico	MCZ	Shipping five cases of birds, including fine series of Mangrove Yellow Warbler and Frazer's Green Heron, also small series of Belding's (Clapper) Rail. Collected several sets of Ringed (Wilson's) Plover eggs at Pichilingue Island. "It will be a question if I will be able to find the nest and eggs of the Mangrove Yellow Warbler as most of them are in my collection. And this also applies to Frazer's [sic] Green Heron—most of them being in my collection." Bill enclosed for \$3,020.00.
25 Aug 1908	John Thayer	Sierra de Laguna, B.C.S., Mexico	MCZ	San Jose Island collection not shipped properly. Received check for \$650. Learned song of Mangrove Warbler in Yucatan in 1893 and whistled it in mangroves near La Paz, and they answered, and that was how he collected so many. Offered \$0.50 a bird to duck hunters and local taxidermist for mangrove warblers, but they all failed to get it. Green herons very shy and difficult to get. "I hope I will never be sent on another expedition where I have to hunt certain rare species, for one loses much time and it spoils one's average." Have series of little pygmy owl from Sierra Laguna. Specimens of Great-horned and Screech owls. Egg sets of Band-tailed Pigeon, Spotted Towhee, Warbling Vireo, Cassin's Vireo. Also nest and eggs of Laguna sparrow (Rufous-crowned) and Goldfinch. Also Merula (Robin) and Juncos. June is the proper time for nests.

APPENDIX 1. CONTINUED.

Date	To	Written from	Housed at	Notes
19 Jan 1909	Outram Bangs	La Paz, B.C.S., Mexico	MCZ	Stopped collecting in Sept 1908 because of lack of supplies and poor plumage of birds. Left for U.S. for firearms supplies and smuggled them back in Nov, then began collecting again. Collected series of Belding's Yellowthroats at marsh at Buena Vista near La Paz, also Marsh Wrens, a short-eared owl, and elf owl. At El Sauz at 4,000 ft took over 70 <i>Laguna</i> (Rufous-crowned) sparrows. At Miraflores, "the back door of the tent commanded the tules as I was able to shoot Belding's Maryland Yellowthroats while making up skins at my table." 375 specimens. Next leaving for San Ignacio for Brown's song sparrow. On 26 Dec at El Sauz found a Band-tailed Pigeon nest with egg. Also several others were found with young ones. Very similar to above letter of 19 Jan.
20 Jan 1909	John Thayer	La Paz, B.C.S., Mexico	MCZ	Leaving for Loreto. Visited islands of San Jose, San Francisco, and El Callo Rock. Collected a new <i>Neotoma</i> on San Francisco. Forty eggs and 40 skins of Craveri's Murrelet taken on El Callo. Young take to water 2 days after hatching. Incubation 22 days. Males incubate during day. Collected two while lying in bed. "This is the first collecting I have done in bed." Also collected eggs of this species on San Francisco Island. Also on San Francisco found a nest of a bald eagle. Great Blue Heron colony breeding in a lagoon on San Jose Island. 25 eggs taken. Also eggs of Osprey. Also booby, oystercatcher, and Snowy Egret skins. Nearly identical to above letter.
10 Mar 1909	Outram Bangs	La Paz, B.C.S., Mexico	MCZ	
	John Thayer	La Paz, B.C.S., Mexico	MCZ	
18 Jun 1909	John Thayer	La Paz, B.C.S., Mexico	MCZ	Just returned from Isla Idefonso For Heermann's Gull. Collected 610 sets. Peregrine Falcon would harass colony. Also collected Blue-footed Booby eggs. Also Craveri's Murrelet and Rock Wren. Collected at Conondú for Brown's Song Sparrow. Then went to Purisima and collected more for a total of 125 specimens. Also found nests of Least Bittern, American Coot, Yellow-breasted Chat, Vermillion Flycatcher, and Belding's Yellowthroat. Also two sets of eggs of Frazar's Oystercatcher near La Paz. Incomplete date. 24 [] 1909. Planning to go to San Quintin and get a series of Elegant Tern. Also Sierra de San Pedro Martir for Mt. Quail. Met Loomis at California Academy of Science and Joseph Grinnell at MVZ. At Pasadena met Pingree Osburn and talked of Tres Marias. Brown's collection of 610 sets of Heermann's Gull apparently did not make it to Boston.
	Outram Bangs	San Diego, California	MCZ	
10 Dec 1909	Outram Bangs	San Diego, California	MCZ	Just returned from trip to San Quintin and San Pedro Martir. Only found Royal Terns at San Quintin. Collected a large series of Mt. Quail. Many fires on mountain required him to move camp five times, with two narrow escapes. No condors seen, probably due to fires. Collected two pronghorn. Also series of <i>Tamias</i> and <i>Peromyscus</i> , as well as Pinon Jays (<i>Gymnorhinus cyanocephalus</i>). Camped at 7,000 ft but prevented from going higher by heavy snow in late Nov. Seven Black Terns collected on return to San Quintin. Probably staying in San Diego for the winter. "Are you interested in China or the Pacific islands?"
25 Aug 1910	John Thayer	Mexico City	MCZ	Dr. John Phillips requests he spend a month collecting at Lerma. Describes armada-style duck shooting around Mexico City for markets. Has series of Black (Mexican) Ducks in collection. Preparations for Mexican centennial on 16 Sept ongoing. Strong anti-American attitudes due to U.S. actions in Nicaragua.

APPENDIX I. CONTINUED.

Date	To	Written from	Housed at	Notes
15 Jan 1911	Outram Bangs	Puebla, Mexico	MCZ	Shipped two cases with 400 bird skins day before. Contains yellowthroats, woodpeckers, sparrows, and rails and the endemic Red-winged Blackbird. Series of Mexican ducks sent to Dr. Phillips and Bangs. Heavy fighting in Chihuahua. Strong anti-American feelings. Dr. Phillips has commissioned him to collect house sparrows from many different locations in Mexico and Bermuda.
9 Mar 1911	Outram Bangs	Mexico City	MCZ	Postcard of ruins of Xochicalco. Letter received day before. "Am off for Grand Cayman!" Will go through Cuba via Veracruz.
13 Mar 1911	Outram Bangs	Veracruz, Mexico	MCZ	Postcard of boats in Veracruz harbor. Requesting labels. Arrived day before and sails next day for Havana, Cuba.
27 Mar 1911 3 Apr 1911	Outram Bangs	Kingston, Jamaica Grand Cayman	MCZ MCZ	Postcard of fisherman's village. "I sail tonight for Grand Cayman." Note to W. W. Brown from Commissioner's office denying request to collect birds due to the birds breeding. Will allow after breeding if a written letter from professor of zoology at Harvard University is received.
10 May 1911		Grand Cayman	MCZ	Note to W. W. Brown from Commissioner's office rescinding permission to shoot birds granted on 10 April 1911 due to list of birds needing protection received from Secretary of State office. Handwritten note at bottom from W. W. Brown telling Bangs that he is prohibited from collecting all endemic birds of island.
15 May 1911	Outram Bangs	British West Indies	MCZ	Out of money. Has not received any from Dr. Phillips or Bangs. Requests \$500. Has been collecting birds in Grand Cayman. "Have taken six fine specimens of the very rare <i>Icterus bairdi</i> (Cuban Oriole)—this species is on the verge of extinction! Of <i>Miniorchila rorida</i> (Grand Cayman Thrush, <i>Turdus ravidus</i>) which is as rare as Baird's Oriole. I took eight fine specimens. It is not only very rare, but very hard to find as it is very secretive in its habits. Ten years ago this species was quite common, but it now appears to be on the verge of extinction!" Also series of <i>Spindalis</i> (Tanager) and <i>Melopyrrha</i> (Cuban Bullfinch).
4 Jul 1911	Outram Bangs	Cayman Brac, British West Indies	MCZ	Out of money. Has not received letter of credit. Has turned over collection as security until he receives it. "Collection contains 17 specimens of Cuban Oriole." Have taken a small <i>Dendroica</i> warbler, probably <i>Dendroica craufordii</i> [probably the Vitelline Warbler, <i>Setophaga vitellina</i>]—a resident species, has taken the young. On 10 May received a new permit that prohibited shooting most endemics. "However my collecting blood was up by this time, so hiding what I had already collected. I went on collecting just as if the gov. of Jamaica and the Gov. of Grand Cayman had never been heard from." Collection of 300 birds. Also small collection of reptiles. "I trust that the above collection will please Mr. Henshaw."
16 Sep 1911	Samuel Henshaw	Atlantic City, New Jersey	MCZ	Requesting payment of \$125 per month as promised for Grand Cayman collecting. Long recomiting of Cayman trip. List of birds collected. Trained hunters to help him collect on Grand Cayman. Thirteen thrushes collected with help of assistants. Also 17 Cuban Orioles. "Mr. Ridgway has never seen an example of this little known Icterus." Over 50 <i>Spindalis</i> , "one Mr. Ridgway has never seen." 53 Cuban Bullfinch collected. Five specimens of Grand Cayman dove (<i>Leptoptila collaris</i>). Blames imminent extinction of birds to cats and fire ants.
22 Oct 1911	Samuel Henshaw	New York City	MCZ	Still looking for payment. "Although I am no longer dependent on 'collecting' for an income, I shall still continue to be a zoological collector, whenever opportunity arises."

APPENDIX I. CONTINUED.

Date	To	Written from	Housed at	Notes
31 Oct 1911	Outtram Bangs	New York City	MCZ	Still nothing from Henshaw. Staying near the American Museum and Bronx Zoo. A large Naval Review in the Hudson with 112 battleships and cruisers.
26 Aug 1912	Joseph Grinnell	Long Beach	MVZ	Arrived a week ago from Mazatlan, Mexico. Requests assistance in getting permit for collecting in California. Interested in collecting owls. Asks about Seven Oaks in San Bernardino Islands as collecting location. Collecting for Dr. Sanford of AMNH.
22 Sep 1912	Outtram Bangs	Avalon, Catalina Island, California	MCZ	"I am back again from Mexico and Mrs. Brown joined me some time ago." Just returned from Baja. "conditions were very unsettled, with bands of bandits roving about and robbing." "It was a trip beset with many difficulties and dangers." "Frank Stephens has now given up collecting and is now running a ranch near San Diego. I understand he was obliged to give up collecting on account of his sight and hearing." "The Audubon society has made collecting in California very difficult, and one has to have a gilt edged recommendation now days to get a permit to collect birds." Theodore Roosevelt arrived in Los Angeles to great ovation. He will carry California. Bryan will arrive in Los Angeles shortly. "I envy you attending the championship series between the Boston Americans and the Giants." Newspaper article clipping describing American robbed and killed by guide in Baja. They were followed by soldiers and the guide and 14 companions shot.
25 Sep 1912	Joseph Grinnell	Avalon, Catalina Island, California	MVZ	Permit refused. Asks for recommendations on staying in San Bernardino Islands. Mentions Frank Stephens and impending Grinnell paper on Lower Colorado River.
13 Oct 1912	Joseph Grinnell	Long Beach, California	MVZ	Interested in Flamulated Owl. Looks like permit will be granted. Inquires about several other species of interest there.
24 Apr 1914	John Thayer	Loraine, Kern County, California	MCZ	Just shipped three cases of mammals and birds from Piute Mtns. 175 well-prepared mammal skins. Two species of Chipmunks at Piute Mtns. One at 5,000 ft and the other at 8,000 ft.
28 Jul 1916	John Thayer	Yuma, Arizona	MCZ	Sending four cases of birds and mammal skins. Collected from 5 May to 22 July. Hunted for Horned Larks. Trouble between Mexicans and Americans in Yuma.
22 Jun 1918	Outtram Bangs	Somerville, Massachusetts	MCZ	Back in Massachusetts with Mrs. Brown. Expects to be here through summer. May go to Squirrel Island, Maine, for a few weeks in August
1918?			MCZ	Short note accompanying parrot skin. Parrot secured as nestling in August 1911 on Cayman Brac. Died 1917 in the Huachuca Mtns, Arizona. Not dated.
1 Feb 1919	Outtram Bangs	St. Petersburg, Florida	MCZ	Cayman Brac parrot received in museum. "I have not done any collecting, not having a permit." Reading up on finance and wants to build savings. Mr. Merrill of Sitka Alaska helped on trip there. Will remain here until next May.
19 Feb 1921	Outtram Bangs	El Paso, Texas	MCZ	Sent Dr. Barbour a collection of reptiles collected in Huachuca Mtns, Arizona. Left Ramsey Canyon, Huachuca Mtns. 3 weeks ago. Permit expired.
5 Mar 1921	MCZ	El Paso, Texas	MCZ	"Please transfer reptile collection out of tin can and into zinc."
15 Jan 1924	Samuel Henshaw	San Luis Potosí, Mexico	MCZ	Leaving for southern Mexico to collect for Thayer. Asks to please secure collecting permit on behalf of MCZ and send to him.
4 Aug 1924	John Thayer	Miquihuana, Tamaulipas, Mexico	MCZ	Left Texas 18 May. Looking for <i>Vermicora browni</i> . Found a few in mountains higher up. 119 mammal skins, 180 bird skins, and 100 reptiles and 82 bird egg sets. List of birds collected. 53 skins of Worthen's Sparrow and 25 egg sets. Description of nests and habits.

APPENDIX I. CONTINUED.

Date	To	Written from	Housed at	Notes
27 Oct 1924	John Thayer	San Luis Potosí, Mexico	MCZ	Series of reptiles collected at Miquihuana. Political situation quiet.
17 Jan 1925	John Thayer	San Luis Potosí, Mexico	MCZ	Received check for \$500. Leaving for Motzorango. Took series of Blue-eared Jay, 90 birds skins and five mammal skins. List of species and number of each enclosed.
19 Apr 1925	John Thayer	Motzorango, Veracruz, Mexico	MCZ	Collected nice series of Sumichrast's Wren. Describes dense forest.
17 May 1925	John Thayer	Motzorango, Veracruz, Mexico	MCZ	Collected 18 specimens of Sumichrast's Wren in new area. Also a tanager and different wren collected. Over 80 specimens since last letter. Also collected large black gopher.
2 Aug 1926	W. W. Brown	Lancaster, Massachusetts	MCZ	Letter from John Thayer to Brown. Will pay \$200 for collection.
1 Sep 1926	John Thayer	San Luis Potosí, Mexico	MCZ	Northern migrants have recently arrived. Very tame Townsend's Warblers. Series of Violet-eared Hummingbirds. 20 specimens of Bumblebee hummingbird. Also other hummingbird species. Series of Black-fronted Goldfinch. 120 mammal skins.
22 Oct 1926	John Thayer	San Luis Potosí, Mexico	MCZ	Just shipped birds and mammal collection for 3 months of collecting. Each specimen poisoned with arsenic. 300 specimens. Spent 3 months in mountains 40 miles from San Luis Potosí at 8,000 ft (Alvarez). Mentions shell collections from Veracruz and San Luis Potosí.
25 Oct 1926	Outram Bangs	San Luis Potosí, Mexico	MCZ	Has now been traveling in Mexico for over 4 years. Sent recent collection to Thayer. 200 mammals collected in Alvarez at 8,000 ft. Also 100 birds, including a series of <i>Atthis</i> (Bumblebee) hummingbird and Green Violet-ear. Also Black-headed Siskin. Also collected in Veracruz at Hacienda el Portrero. Lots of bandits. Tried to sell collection to Thayer but he was not interested. Cousins of Mrs. Brown have a home in St. Petersburg, Florida, and they may return there.
5 Jan 1927	John Thayer	San Luis Potosí, Mexico	MCZ	Will collect for \$150/mo plus expenses for Thayer at localities specified. Will look for Flammulated Flycatcher (<i>Deltarhynchus</i>). Notes <i>Atthis heloisa</i> and <i>Atthis morcomi</i> may be same species (Bumblebee Hummingbird).
1 Mar 1927	John Thayer	Chivela, Oaxaca, Mexico	MCZ	Likely late March letter. Ill with tropical sores (described like leishmaniasis). Chivela at 600 ft. 100 bird specimens and many reptiles, Magpie-jay, orioles, and wrens. Varied Bunting. Pygmy owl family near house. Pair of macaws nearby.
22 Jun 1927	Outram Bangs	Chivela, Oaxaca, Mexico	MCZ	Revolution in Mexico dangerous. Staying at Hacienda that allows firearms. Has made collection of flycatchers of Isthmus of Tehuantepec.
29 Jun 1927	Outram Bangs	Salina Cruz, Oaxaca, Mexico	MCZ	Heading to mountains to look for Flammulated Flycatcher.
7 Aug 1927	John Thayer	Tapanatepec, Oaxaca, Mexico	MCZ	Check for \$450 received. Came to collect at Cocoprieto, type locality for <i>Deltarhynchus</i> flycatcher. Dangerous due to bandits.
10 Aug 1927	Outram Bangs	Tapanatepec, Oaxaca, Mexico	MCZ	Bandits in area are dangerous. Staying near Sumichrast's collecting grounds. Collected streaked flycatcher that may be Flammulated. Looking for elevation records of Flammulated to narrow down area to search.
1 Dec 1927	John Thayer	Tapanatepec, Oaxaca, Mexico	MCZ	Four cases of bird skins shipped. Many flycatchers including likely <i>Deltarhynchus</i> .

APPENDIX I. CONTINUED.

Date	To	Written from	Housed at	Notes
20 Dec 1927	Outram Bangs	Tapanatepec, Oaxaca, Mexico	MCZ	300 specimens shipped. Has now been in Mexico 5 years. Three boxes of reptiles sent to Dr. Barbour.
28 Feb 1928	John Thayer	Mexico City	MCZ	" <i>Deliahiuchus</i> was most difficult of all the rare birds I have attempted to collect. Now back in Mexico City and ready for a new assignment."
28 Mar 1928	Outram Bangs	San Antonio, Texas	MCZ	Mrs. Brown happy to be back after 5 years in Mexico. Had all her things in storage and was worried about them. Looking for new opportunities.
8 Jan 1929	John Thayer	Cloudercroft, New Mexico	MCZ	Made collection of small mammals at 9,000 ft elevation. 182 specimens. Also 18 bird skins. Also shipped four bird skins and one bat skin recently received from Tapanatepec that were in storage. Discusses conditions around Cloudercroft. Explains why he and Mrs. Brown declined to work in Jalisco and Guerrero mentioned in letter by Goldman. Describes dangerous events there and political unrest. Things are calming there and it may be possible to work there again. Many museums are sending expeditions to Africa, including Frank Chapman. Wondering where to go next and ready to be sent anywhere in the spring.

APPENDIX 2. TAXA NAMED IN HONOR OF W. W. BROWN.

Class	Taxon	Common Name	Citation
Aves	<i>Thryorchilus browni</i>	Timberline Wren	Bangs, 1902
Aves	<i>Elaenia frantzii browni</i>	Mountain Elaenia	Bangs, 1898b
Aves	<i>Vireo brevipennis browni</i>	Slaty Vireo	Miller and Ray, 1944
Aves	<i>Spizella wortheni browni</i>	Worthen's Sparrow	Webster and Orr, 1954a
Aves	<i>Sicalis citrina browni</i>	Stripe-tailed Yellow-Finch	Bangs, 1898b
Mammalia	<i>Microsciurus alfari browni</i>	Central American dwarf squirrel	Bangs, 1902
Reptilia	<i>Mixcoatlus browni</i>	Brown's montane pit viper	Shreve, 1938
Reptilia	<i>Micrurus browni</i>	Brown's coral snake	Schmidt and Smith, 1943

LITERATURE CITED

Abbott, C. G. 1933. Closing history of the Guadalupe Caracara. *Condor* 35: 10–14.

Allen, J. A. 1886. The masked bobwhite (*Colinus ridgwayi*) in Arizona. *The Auk* 3: 275–276.

Allen, J. A. 1887. Bryant on the Ornithology of Guadalupe Island. *The Auk* 4: 154–154.

Anderson, D. W., J. E. Mendoza and J. O. Keith. 1976. Seabirds in the Gulf of California: a vulnerable international resource. *Natural Resources Journal* 16: 483–505.

Anonymous. 1906. Notes and News. *Condor* 8: 60.

Anthony, H. E. 1923. Mammals from Mexico and South America. *American Museum Novitates* 54: 1–10.

Bahre, C. J., 1991. *A Legacy of Change. Historic Human Impact on Vegetation of the Arizona Borderlands*. The University of Arizona Press, Tucson.

Bangs, O. 1898a. On some birds from Santa Marta, Colombia. *Proceedings of the Biological Society of Washington* 12: 131–144.

Bangs, O. 1898b. On some birds from Pueblo Viejo, Colombia. *Proceedings of the Biological Society of Washington* 12: 157–160.

Bangs, O. 1899. The hummingbirds of the Santa Marta region of Colombia. *The Auk* 16: 134–139.

Bangs, O. 1901a. The mammals collected in San Miguel Island, Panama, by W. W. Brown, Jr. *American Naturalist* 35: 631–644.

Bangs, O. 1901b. On a collection of birds made by W.W. Brown, Jr., at David and Divala, Chiriqui. *The Auk* 18: 355–370.

Bangs, O. 1901c. Birds of San Miguel Island Panama. *The Auk* 18: 24–32.

Bangs, O. 1902. On a second collection of birds made in Chiriqui, by W. W. Brown, Jr. *Proceedings of the New England Zoological Club* 3: 5–7.

Bangs, O., and J. L. Peters. 1927. Birds from the rain forest region of Vera Cruz. *Bulletin of the Museum of Comparative Zoology* 67: 471–487.

Barrow, M. V., Jr. 1998. *A Passion for Birds: American Ornithology after Audubon*. Princeton, New Jersey: Princeton University Press.

Batty, J.H. 1880. Practical taxidermy, and home decoration: together with general information for sportsmen. New York: Orange Judd Company.

Bowen, T. 2013. The type locality of Craveri's Murrelet *Synthliboramphus craveri*. *Marine Ornithology* 41: 49–54.

Bowen, T., E. Velarde, D. W. Anderson, and S. A. Marlett. 2015. Federico Craveri and changes in nesting seabirds on Isla Rasa, Gulf of California, since 1856. *The Southwestern Naturalist* 60: 1–5.

Brown, D. E., 1989. *Arizona Game Birds*. Tucson: University of Arizona Press.

Brown, D. E., K. B. Clark, R. Babb, and G. Harris. 2012. An analysis of masked bobwhite collection locales and habitat characteristics. *Proceedings of the National Quail Symposium* 7: 305–328.

Brown, W. W. 1906. *Report on the Birds and Mammalia Recorded during a Visit to the Islands of Guadalupe, Cedros, Natividad, and San Benitos in the Spring of 1906*. Unpublished manuscript. San Diego Natural History Museum.

Carlton, L. A. 1922. *History of a Hunting Trip in Sierra Madres. August 21, to October 1, 1922*. Houston, Texas: Self-published diary. University of Texas at Austin.

Carmony, N. B. 2009. A naturalist takes up ranching in the White Mountains: E. W. Nelson and the merriam elk, 1884–1890. PP 59–79 IN: D. E. Brown, editor. *Arizona Wildlife: The Territorial Years, 1863–1912*. Phoenix, Arizona: Arizona Game and Fish Department.

Clark, K. B. 2019. An 1884 photograph of the vegetation of the Baboquivari plain, Arizona. *Desert Plants* 35(1): 43–45.

Cory, C. B. 1892. Remarks on a collection of birds made by Wilnot W. Brown, Jr., on Mona and Porto Rico during February and a part of March. *The Auk* 9: 228–229.

Davis, J. 1974. Obituary: Chester Converse Lamb. *The Auk* 91: 479–480.

Erickson, R. A., R. A. Hamilton, and S. G. Mlodinow. 2008. Status review of Belding's Yellowthroat *Geothlypis beldingi*, and implications for its conservation. *Bird Conservation International* 18: 219–228.

- Gadow, H. 1908. *Through Southern Mexico: Being an Account of the Travels of a Naturalist*. London: Witherby & Co.
- García-Aguilar, M. C., C. Turrent, F. R. Elorriaga-Verplancken, A. Arias-Del-Razo, and Y. Schramm. 2018. Climate change and the northern elephant seal (*Mirounga angustirostris*) population in Baja California, Mexico. *PLoS One* 13(2): p.e0193211.
- Greer, A. E., 1966. Viviparity and oviparity in the snake genera *Conopsis*, *Toluca*, *Gyalopion*, and *Ficimia*, with comments on *Tomodon* and *Helicops*. *Copeia* 1966: 371–373.
- Heckadon-Moreno, S. 2004. *Naturalists on the Isthmus of Panama: A Hundred Years of Natural History on the Biological Bridge of the Americas*. Panama: Smithsonian Tropical Research Institute.
- Hitchcock, F. H. 1890. Capture of a second specimen of the Hooded Warbler in Massachusetts. *The Auk* 7: 407.
- Hubbard, J. P., and C. J. Dove. 2013. Our reevaluation of a Worthen's Sparrow and three other anomalous specimens from Charles H. Marsh's 1884–1886 collections of birds from southwestern New Mexico [Internet]. Unpublished manuscript [cited 2019 September 27]. Available from: https://www.researchgate.net/publication/259563429_OUR_REEVALUATION_OF_A_WORTHEN%27S_SPARROW_AND_THREE_OTHER_ANOMALOUS_SPECIMENS_FROM_CHARLES_H_MARSH%27S_1884-1886_COLLECTIONS_OF_BIRDS_FROM_SOUTHWESTERN_NEW_MEXICO. Last accessed January 14, 2020.
- Johnston, D. W. 1969. The thrushes of Grand Cayman Island, B.W.I. *Condor* 71: 120–128.
- Knox, A. C., 1993. Richard Meinertzhagen—a case of fraud examined. *Ibis* 135: 320–325.
- Mayr, E., 1942. *Systematics and the Origin of Species from the Viewpoint of a Zoologist*. New York: Columbia University Press.
- Mellink, E. 2001. History and status of colonies of Heermann's Gull in Mexico. *Waterbirds: The International Journal of Waterbird Biology* 24: 188–194.
- Miller, A. H., and M. S. Ray. 1944. Discovery of a new vireo of the genus *Neochloe* in southwestern Mexico. *Condor* 46: 41–45.
- Moran R. 1996. The flora of Guadalupe Island, Mexico. *Memoirs of the California Academy of Sciences*, No. 19. San Francisco: California Academy of Sciences.
- Olson, S. L. 2008. Falsified data associated with specimens of birds, mammals, and insects from the Veragua Archipelago, Panama, collected by J. H. Batty. *American Museum Novitates* 3620: 1–37.
- Peters, J. L. 1933. Outram Bangs, 1863–1932. *The Auk* 50: 265–274.
- Peterson, A. T., A. G. Navarro-Sigüenza, and R. Scachetti Pereira. 2004. Detecting errors in biodiversity data based on collectors' itineraries. *Bulletin of the British Ornithologists' Club* 124: 143–151.
- Phillips, A., J. Marshall, and G. Monson. 1964. Tucson: *The Birds of Arizona*. The University of Arizona Press.
- Phillips, A. R. 1977. E. C. Jacot, 1889–1966. *Journal of the Arizona-Nevada Academy of Science* 12: 91–93.
- Phillips, J. C. 1934. John Eliot Thayer 1862–1933. *The Auk* 51: 46–51.
- Quintana-Barrios, L., G. Ruiz-Campos, P. Unitt, and R. Erickson. 2006. Update on the birds of Isla Guadalupe, Baja California. *Western Birds* 37: 23–36.
- Rasmussen, P. C., and N. J. Collar. 1999. Major specimen fraud in the Forest Owllet *Heteroglaux* (*Athene* auct.) *blewitti*. *Ibis* 141: 11–21.
- Rodríguez-Estrella, R., L. R. Delgado, E. P. D. de Bonilla, and G. Blanco. 1999. Belding's yellowthroat: current status, habitat preferences and threats in oases of Baja California, Mexico. *Animal Conservation Forum* 2: 77–84.
- Rothschild, M. 2008. *Walter Rothschild: The Man, the Museum, and the Menagerie*. London: Natural History Museum.
- Schmidt, K. P. 1926. The amphibians and reptiles of Mona Island, West Indies. *Field Museum of Natural History*. Publication 236 of the *Zoological Series* 12: 149–163.
- Schmidt, K. P., and H. M. Smith. 1943. Notes on coral snakes from Mexico. *Field Museum of Natural History* 29: 25–31.
- Schmidt, R. H. 1991. Gray wolves in California: their presence and absence. *California Fish and Game* 77: 79–85.
- Shreve, B., 1938. A new *Agkistrodon* from Mexico. *Copeia* 1938: 9.
- Sibley, C. 2010. Six trips to Mexico, 1939–1950. PP. 268–296 IN: K. Winker, editor. *Moments of Discovery: Natural History Narratives from Mexico and Central America*. Gainesville: University Press of Florida.
- Smith A. P. 1908. Destruction of Imperial Woodpeckers. *Condor* 10: 91.
- Snyder, N. F. R., D. E. Brown, and K. B. Clark. 2009. *The Travails of Two Woodpeckers*. Albuquerque: University of New Mexico Press.
- Spicer, E. H., 1980. *The Yaquis: A Cultural History*. Tucson: University of Arizona Press.
- Stearn, W. T. 1998. *The Natural History Museum at South Kensington: A History of the Museum, 1753–1980*. London: Natural History Museum.

- Stephens, F. P. 1885. Notes of an ornithological trip in Arizona and Sonora. *The Auk* 2: 225–231.
- Stephens, F. P. 1906. *California Mammals*. San Diego: West Coast Publishing Company.
- Thayer, J. E. 1906. Eggs and nests of the Thick-billed Parrot (*Rhynchopsitta pachyrhyncha*). *The Auk* 23: 223–224.
- Thayer, J. E. 1909a. Letters from Wilmot W. Brown, Jr., from the cape region of Lower California. *Condor* 11, 142–143.
- Thayer, J. E. 1909b. Some rare birds and sets of eggs from the cape region of Lower California. *Condor* 11: 10–11.
- Thayer, J. E. 1911. A nesting colony of Heermann Gulls and Brewster Boobies. *Condor* 13: 104–106.
- Thayer, J. E. 1925. The nesting of the Worthen Sparrow in Tamaulipas, Mexico. *Condor* 27: 34.
- Thayer, J. E., and O. Bangs. 1905. The mammals and birds of the Pearl Islands, Bay of Panama. *Bulletin of the Museum of Comparative Zoology* 46: 137–160.
- Thayer, J. E., and O. Bangs. 1908. The present state of the ornithology of Guadalupe Island. *Condor* 10: 101–106.
- Velarde, E., and D. W. Anderson. 1994. Conservation and management of seabird islands in the Gulf of California: setbacks and successes, PP. 229–243 IN: D. N. Nettleship, J. Burger, and M. Gochfeld, editors. Birdlife Conservation Series 1. *Seabirds on Islands: Threats, Case Studies and Action Plans*. Cambridge, U.K: BirdLife International.
- VertNet [Internet]. 2016. National Science Foundation; c2016 [cited 2019 Sept 27]. Available from: www.vertnet.org.
- Webster, D. J., and R. T. Orr. 1954a. Summering Birds of Zacatecas, Mexico, with a description of a new race of Worthen Sparrow. *Condor* 56: 155–160.
- Webster, J. D., and R. T. Orr. 1954b. Miscellaneous notes on Mexican birds. *Wilson Bulletin* 66: 267–269.
- Whitfield, S. M., P. Frezza, F. N. Ridgley, A. Mauro, J. M. Patterson, A. Pernas, and J. J. Lorenz. 2018. Status and trends of American Flamingos (*Phoenicopterus ruber*) in Florida, USA. *The Condor: Ornithological Applications* 120: 291–304.